Environmental policy-making in India – the process and its pressures

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1 Introduction

Objective of the report

This report attempts to take a look at the process of environmental policy-making in India with respect to the management of water, air and municipal solid waste. It does so not by merely listing the landmark events that have occurred during this process or the legislation issued. Instead, the report tries to take a look beyond and behind these hard facts and the figures that corroborate/support them, to bring out the "softer" issues – the institutional links and stakeholder interactions that influence the development of environment-related policy in India.

The chapter on water looks at the availabilty and management of this valuable resource, and at the evolution of water policy in the context of the stakeholders involved and their varied influence on this process. The chapter on air covers the various sectors that affect ambient air quality and provides a commentary on the bottlenecks in the implementation of policy. In the context of municipal solid waste, issues such as the functioning of the urban local bodies and decentralisation in the set-up for policy implementation come to light and are discussed in the concerned chapter.

The evolution of environmental policy in India

India is one of the few countries in the world that has objectives related to the conservation of the environment enshrined in its Constitution almost since the time of its adoption. The first concrete shape to an actual policy on the environment stemmed from the influence of the Human Environment Conference at Stockholm in 1972 where the then Prime Minister Mrs. Indira

Gandhi addressed the issue of poverty being one of the greatest polluters of the environment. The plight of the developing countries was highlighted. They are caught in a vicious circle where the path of modern devlopment undertaken cannot be abandoned as there are so many still left to be given even the basic services. On the other hand, they are aware that they are treading the path the developed countries are already familiar with – that of polluted environs and a gradual movement towards compromising short-term economic development, keeping in mind the long term gains for the environment and its sustained use by humans.

The National Conservation Strategy brought out by the government in 1992 reiterates this by classifying the environmental problems in India into two categories – those arising as a result of the negative efects of the very process of development, and those arising from the conditions of poverty and underdevelopment.

The evolution of the government set-up for dealing with the environment

In 1981, when the Department of Environment was set up, the members were given the mandate of making the Department redundant within a time frame of 50 years, by Mrs. Indira Gandhi. The intention was to accomplish the integration of environmental concerns into the development process so completely within this period, that there would be no need for any agency to make sure that this was being done. Ironically, that Department has grown into a full-fledged Ministry of Environment and Forests. The mandate of the environmental face of the Government of India has grown from conducting environmental assessments of development projects, starting from river valley projects, to dealing with all policy and implementation matters relating to the more participatory and decentralized. It is an approach that tries to gain strength from a judicious mix of incentives and regulations rather than from rules alone.

Methodology of the Report

In this report we have tried to go beyond a mere desk study and included interviews with officials from government organisations, NGOs and research institutions (including TERI itself). Through such a stakeholder analysis, it has been possible to place each stakeholder according to their role in and their opinions of the policy-making process in India.

mitigation, control or prevention of environmental pollution including technology transfers and issuing of relevant legislation, etc.

The legal framework

The **42nd Constitutional Amendment, 1976** incorporated the provision for the protection and improvement of the environment in the Constitution. The **Directive Principles of State Policy** enjoin the State to make endeavours for the same as well as for safeguarding the forest areas and wildlife of the country. It has also been made the one of the Fundamental Duties of every citizen of India.

Some of the older laws do address environmental issues – for instance the Indian Penal Code (1860) and the Factories Act (1948). The first attempt at bringing out an umbrella legislation was the **Environment Protection Act, 1986.**

Recently, there has been a spate of laws being passed, that are generally applicable for all areas of the environment (the specific laws will be covered in the respective chapters). These laws, such as the **Policy Statement for Abatement of Pollution, 1992** and the **National Conservation Strategy and the Policy Statement for Environment and Development, 1992,** bring out the new face of the environment approach in India. These recognise the role of the private sector, NGOs, and of the citizens, in making a realistic future out of the vision of a less polluted environment.

The shift in approach

The change in attitude, given a formal face in the recently issued legislation, involves a shift from a predominantly regulatory approach to enforcement of measures for cleaner production processes and energy efficiency, to one that is

2 Water

This chapter describes the evolution of water policy in India. It begins with a discussion of the organizational set-up for water policy formulation. A discussion on the legal framework follows. The next section describes the evolution of water policy in India in terms of a stakeholder analysis. Examples of ground water legislation, irrigation pricing reform, irrigation management transfer, and decentralization and traditional harvesting for drinking water are discussed. The final section discusses some constraints to technological improvement in industrial, domestic and agricultural sectors.

The organisational set-up for water policy formulation in India

This section describes the organizational framework, i.e. the government set-up for water policy formulation in India. This is followed by a discussion on the weaknesses in this framework. Some bottlenecks to effective policy formulation and implementation are identified. Comparisons with other countries are also made.

The set-up in the government

The Ministry of Water Resources

At the Central level, the Ministry of Water Resources (MOWR) is the nodal ministry responsible for water. It was set up in 1985. It is responsible for developing, conserving and managing water as a national resource.

It covers areas as diverse as irrigation, multi-purpose ground water exploitation, and Command Area Development, drainage and flood control. It also tackles issues related to waterlogging, soil erosion, dam safety, and creation of structures for navigation and hydropower. It also oversees the development and regulation of inter-state rivers.

Under this ministry, three principal technical organizations have been created (Figure 1). *The Central Water Commission* is responsible for developing surface water. The *Central Ground Water Board* monitors and develops ground water resources. The *National Water Development Agency* was set up to assess possibilities for inter-basin water transfers.

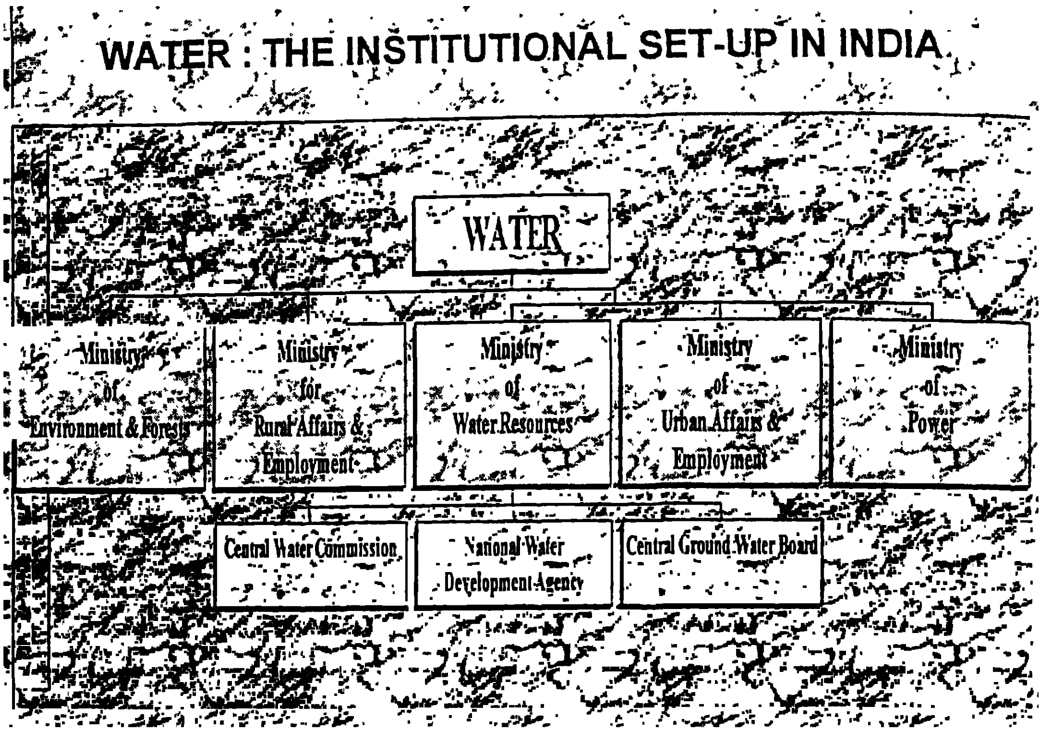
WATER : THE INSTITUTIONAL SET-UP IN INDIA
WATER
Ministry of Environment & Forests
Ministry for Rural Affairs & Employment
Ministry of Water Resources
Ministry of Urban Affairs & Employment
Ministry of Power
Central Water Commission
National Water Development Agency
Central Ground Water Board

Figure 1. Institutional Framework for water management in India

Involvement of other ministries

Water quality and environmental matters come largely under the Ministry of Environment and Forests (MOEF). The MOEF coordinates India's *Environmental Action Plan* and has also launched a number of other programs including the Wetlands Conservation Programme and The National River Conservation Plan.

The Ministry of Urban Affairs and Development coordinates projects in urban water supply and sanitation. The Rajiv Gandhi National Drinking Water Mission handles rural water supply and sanitation. This is under the Ministry of Rural Areas and Employment. The Ministry of Power and the Central Electricity Authority handle water for power generation.

Water is also a subject of several other ministries and departments; such as the Ministry of Agriculture (irrigation), Health and Family Welfare, Ministry of Surface Transport, Inland Waterways Authority of India, and for Financing and Planning, the Ministry of Finance, the Planning Commission and the Finance Commission.

Water related data

Water related data is collected by a number of organizations (table 2.1).

Table 2.1 Institutional responsibilities for collecting water related data

Organisation	Surface water quality monitoring	Ground Water Quality monitoring	Drinking Water Quality Monitoring	Sanitation	Drinking Water Supply
Central Pollution Control Board	X	X			
Central Water Commission	X				
State Pollution Control Boards	X	X			
Central Ground Water Board		X			
Ministry of Urban Development				X	X
Ministry of Rural Affairs and Employment			X	X	X
Ministry of Environment and Forests	X			X	
Municipal Authorities			X	X	X

Source. World Bank 1998

The measurement of water quality is conducted by the Central Water Commission, which operates more than 300 water quality monitoring stations in the major and medium river basins. The CPCB (Central Pollution Control Board), in collaboration with the SPCBs (State Pollution Control Boards), in several states, has been separately monitoring aquatic resources at selected locations since 1977.

The MOWR has set up guidelines to standardize procedures for collecting samples from rivers. The Central Ground Water Board first published a map showing the water quality of India's ground water resources in 1977.

Weaknesses of this framework: some bottlenecks to policy formulation and implementation

This institutional set-up makes co-ordination difficult at several levels. This is recognized as a major bottleneck to effective policy formulation and implementation (World Bank 1998). The separation between surface and ground water functions discourages unitary analysis of water and its use as a single resource. The separation of water quality and quantity is also artificial.

Fragmentation by purposes hinders effective inter-sectoral allocation of water, e.g. from agriculture to industry. As water becomes scarce and has to be diverted to high value or priority uses, the current mechanism would be quite inappropriate.

Several functions described above are duplicated, while for many others, functions are unclear. For instance, the CPCB and the SPCB focus on pollution from industrial and domestic sources, while agricultural pollution tends to be overlooked (World Bank 1998).

Another significant lacuna is the absence of required organizations. Water, in India, is a state subject. In the division of functions by the Constitution of India between the Center and the States, the states are empowered to enact laws or frame policies. Even then, few states have set up organizations for planning and allocating water for various purposes.

Irrigation being the largest user of water, the State Irrigation Departments have been responsible for the creation and construction of irrigation works. Most irrigation departments have their origins as public works departments. This has caused a bias in favor of civil works construction, resulting in very limited attention to water planning and management.

As at the Central level, the same manner of fragmentation can be found at the state level, in terms of divisions of functions between ground and surface water, water quality and quantity, urban water supply and sanitation and rural water supply and sanitation. Once again, mechanisms for inter-sectoral coordination are absent.

The National Water Policy (1987) urges states to set up multi-disciplinary units for the management of water. There have been some recent initiatives in this direction. Some states such as Kerala, Rajasthan and Karnataka have already set up such units while Bihar, Gujarat and Madhya Pradesh have redesignated their irrigation departments as water resources departments.

Finally, while the National Water Policy acknowledges the need for setting up river basin organizations to manage water across the political boundaries of states, efforts in this direction have been almost negligible. Barring the Damodar Valley Corporation, there are still no organizations for planning and developing river waters at the level of a river basin.

Comparisons with other countries

The need for coordinated and unified management of water is recognized across several countries. Many nations have set up agencies for this purpose. In Mexico, for instance, the National Water Commission established in 1989 is the sole authority for managing and developing water. In Pakistan and China, on the other hand, while water functions are split among several agencies and departments, apex level bodies have been created to coordinate their functioning (Table 2.2).

Table2.2 Institutional mechanisms for water development in select countries

Country	Institutional set-up
Mexico	National Water Commission (NWC) established in 1989 as sole authority NWC offices in all 31 states co-ordinate with lower levels a river basin organisation for each of six basins
China	Functions split among several ministries Ministry of Water Resources set up for unified water management National Leading Group set up for co-ordination
Syria	Ministry of Irrigation co-ordinates all activities related to the water sector
Turkey	The Directorate of State Hydraulic Works Co-ordinates water use among several agencies and departments
Pakistan	Ministry of Water and Power co-ordinates the management of water across the several agencies Emphasis on participation of provincial irrigation and power departments

The legal and regulatory framework

Water Laws in India

A number of acts in India have a bearing on water policy. They are listed below:

The Easement Act	1882
The Transfer of Property Act	1882
The Land Acquisition Act	1894
The River Boards Act	1956
The Inter-State Water Disputes Act	1956
The Water (Prevention and Control of Pollution) Act	1974
The Water Cess Act	1977
The Hazardous Waste Rules Act	1989
Policy Statement for Abatement and Pollution	1992
Environment Impact Assessment Notification	1994
National Environmental Tribunal Act	1995

The Easement Act, Transfer of Property Act and Land Acquisition Act govern access to surface and ground water. The Easement Act (1882) allows private usufructuary rights (i.e., rights to use a resource) in ground water by viewing it as an attachment to land. It also provides that all surface water is to be treated as belonging to the state, i.e., as state property. The Transfer of Property Act (1882) provides that ownership in ground water can be given to one only if ownership in land overlying it is also transferred. Conversely, the Land Acquisition Act (1894) asserts that if some one is interested in getting rights over the ground water, he would have to be interested in the land. Thus, ground water is viewed essentially as an attachment to land.

The River Boards Act 1956 enables states to enroll the Central Government in setting up an Advisory River Board to resolve issues in inter-state cooperation. The Inter-state Water Disputes Act of 1956 provides for the establishment of the Tribunal Award system as the primary mechanism for resolving inter-state water disputes.

The 1974 Water Act established water quality and effluent standards. It requires that polluting industries must seek permission from the SPCB to discharge waste into effluent bodies. The 1977 Water Cess Act allows a cess (fee) on water- consuming industries and local authorities.

The 1986 Environment Protection Act authorises the Central Government to protect and improve environmental quality, control and reduce pollution from all sources and prohibit or restrict the siting and/or operation of an industrial facility on environmental grounds. The Act also permits individuals to initiate legal action against any one violating it. For example, industries and other polluters not meeting environmental standards are required to develop an action programme within a specific time or close down.

The Bureau of Indian standards established drinking water standards in 1983. Under the 1986 Environment Protection Act, effluent standards were developed with respect to more than 60 categories of industries.

Hazardous waste rules were developed in 1989, providing important tools for the management of hazardous substances and the prevention of surface and ground water contamination. Another regulatory change mandated after 1992-93 requires firms to conduct Annual Environmental audits and submit their findings to their respective PCBs. These standards are in line with international practice.

Under the 1994 EIA notification, an EIA (Environmental Impact Assessment) has been made mandatory for 29 categories of development activities involving investments of more than Rs. 500 million and above. The environmental clearance is given by the MOEF. Then, the 1995 National Environmental Tribunal Act has created a tribunal with power to award compensation for damages to persons, property and the environment arising out of any activity involving hazardous substances.

The most comprehensive policy statement guiding action in water in India is the National Water Policy adopted by the National Water Resources Council (1987). Some of the major tenets of the National Water Policy are its emphasis on conjunctive use of surface and ground water, formation of river basin organizations for the development of water and recognition of water as a scarce economic good.

While some of the contents of the National Water Policy are noteworthy, a major weakness has been that it has not been translated into action (World Bank 1998); few states have put in place laws to support its provisions. At the same time, there is a need to revisit the statement in light of recent developments, nationally as well as internationally, that have a bearing on water policy.

However, some states have started framing water policies; Tamil Nadu in 1994, Orissa in 1995. Rajasthan and Punjab are in the process of finalising water policies. Andhra Pradesh has issued an irrigation sector policy, which also discusses water management issues.

Weaknesses in the current legal framework

While some weaknesses exist in the implementation of environmental laws, other weaknesses arise from the absence of certain laws and inadequate provisions.

For instance, the Easement Act 1882 made all rivers and lakes the absolute right of the state. Thus, surface water, in all its entirety is treated as state property. The rights of individuals are recognized as subject to those of the state.

This framework has led to several instances of conflict and litigation. Individuals have asserted their claim over their rights being lost to the state for developing irrigation projects. The legal uncertainty surrounding surface water rights creates avenues for conflict.

Similarly, as discussed above, all landowners have the right to withdraw water lying beneath their lands. This legal framework promotes neither equity nor sustainability in the use of ground water. On the one hand, the landless are discriminated against and on the other, there are no legal limits to water withdrawals.

The Model Ground Water Bills circulated in 1970 and 1992 only provide for the formation of a Ground Water Authority for issuing licenses for water extraction mechanisms, rather than defining limits to water withdrawals. In the absence of well defined limits to water withdrawals, there is likely to be a limited impact in achieving sustainable ground water use (Saleth, 1996).

The absence of well-defined property rights in water also poses a major obstacle to the task of instituting organized water markets. Several countries have already moved to organized water markets including Chile, Western USA, and Australia. International experience gives ample testimony to the potential of organized water markets in directing water from low to high value uses.

In India, while informal water markets already exist in Gujarat, Haryana and Tamil Nadu, they are at present unregulated. The definition of well-defined property rights in both surface and ground water is an essential prerequisite to the successful functioning of water markets, a subject to which we shall return later in this chapter.

The mechanism of the Tribunal Award system has a number of deficiencies (World Bank 1998). First, it could take very long before a water issue ripens into a fully blown dispute, prompting the states even to consider establishing a tribunal. The decision-making process is often long, complicated and time-consuming. The unwillingness of states to part with relevant data is another major bottleneck. Tribunal discussions also tend to become highly politicized.

Laws also suffer from weak enforcement. The lack of access to resources and technology are considered as bottlenecks among the Small-Scale Iindustry (SSI) with regard to their compliance with cleaner production standards and technologies. Inadequacy of resources with monitoring agencies, material as well as human, is identified as an other factor (Personal Communication, senior CPCB official). In an interview with this official, we learnt that there had been an increase in functions allocated to the CPCB from the Ministry of Environment and Forests without a corresponding increase in allocation of resources. Further, frequent changes in the top management of the State Pollution Control Boards also interferes with effective implementation of pollution control programs and hampers their effectiveness.

Law has been used as a powerful instrument of reform in several parts of the world. Chile's National Water Code of 1981 established tradable rights in water so that it became the foundation of well-functioning water markets. Nepal used the Nepal Water Users Act (1992) to provide a legal sanctity to water users associations. The USA used ground water legislation to address the problem of water drawls; different parts of the USA have different forms of property rights in water.

Evolution of water policy in India: a stakeholder analysis

The case of ground water legislation

In the absence of a legal framework for regulating ground water withdrawals efforts have been made to regulate through licensing, credit or electricity restrictions. These restrictions are directed at the creation of wells. They are enforced by the NABARD, the country's National Bank for Agricultural and Rural Development, the State Electricity Boards and the State Groundwater Boards.

This approach has come under criticism from several quarters, notably the academia. To begin with, these restrictions are directed at the creation of wells. They do not regulate the quantum of water extracted. Further, Shah (1993) has argued that the rich and influential farmers have tended to evade licenses issued for electricity connections. In the event of credit restrictions, the well-off farmers are known to have resorted to informal sources of credit or to even self-finance their structures. Similarly, in the face of electricity restrictions, when the water table is high enough, the affluent farmers have been known to get away with diesel connections.

Water being a state subject, the Center can not enact water legislation. However, the Central Government circulated Model Ground Water Bills in 1970 and 1992 for the states to consider and enact. These bills focus on the creation of a regulatory authority comprising representatives of the government and the technocracy for giving clearances for the installation of wells.

None of the states have enacted this legislation. though Maharashtra and Gujarat have introduced some regulatory measures. At one level, local politicians could be interpreted as seeking to protect a vote bank with peasants. However, the provisions of the bill have come under criticism from several segments of the academia and Non-Government organizations.

To begin with, once again, these regulations seek only to regulate the creation of water extraction mechanisms, rather than the quantum of water withdrawn. Further, academia and NGOs alike criticize this approach on grounds that a system of licenses tends to breed corruption and inequity. Such an approach also assumes a highly simplistic, centralized approach to the problem and ignores the possibility of localized, participative approaches encompassing a wide array of management options suited to diverse sociological as well as hydro-geological contexts.

Moench (1994) has argued in favor of a move towards a more " enabling framework" based on the formation of local water districts for managing water in keeping with the peculiarities of the local hydro-geological and political contexts. Some academia also argue for a move towards a new structure on the lines of the JFM (Joint Forestry Management) programme in India.

Several members of the academia feel that the ground water issue can not be resolved without a water rights structure. Shah and Raju (1988) have referred to the need for a well-defined rights structure in the interest of equity among users. Dhawan (1975) has argued for such a structure in the interest of sustainability. Similarly, Moench (1992) has argued for a similar system for the successful functioning of water markets and water user groups.

Saleth (1996), who has argued in favor of a water rights structure along the public trust doctrine, develops the most comprehensive conceptualization of a property rights structure. Under such a structure, the state is seen as a trustee of the country's water resources under a premise of stewardship; equity can be achieved at the stage of distributing individual and collective water rights, efficiency can be enhanced by permitting the exchange of water rights, and sustainability can be ensured by limiting overall water withdrawals by specifying absolute limits, collectively as well as individually. Saleth (1991, 1993, 1994, and 1996) further demonstrates that India has the technical capability, institutional capacity and the adaptability to implement and monitor such a system.

Multilaterals, such as the World Bank, emphasize a different approach to the problem of ground water management; a shift from a regulatory role of the government to a facilitator of balanced and equitable development. State role is needed to address the wider range of management challenges in ground water including equity in access to ground water and the development of ground water where it has been held back.

Much of the poor growth in Indian agriculture, it is argued, could be attributed to the mismanagement of Irrigation and power supplies. In the context of ground water, power availability and roistering have been identified as being of great significance. Particularly, since ground water's contribution to higher yields comes largely from the timeliness and control that ground water irrigation offers, these differentials would perhaps tend to diminish with erratic power availability. Unreliability of power, moreover, makes farmers pump water whenever it is available-regardless of whether their crop needs it. Then, in several parts of East India, ground water development has been held back by institutional bottlenecks such as the availability of electricity supply and credit.

Thus, it is felt that ground water policy must bear a perspective of these wide range of management concerns, rather than focusing merely on physical depletion of this resource. This paradigm shift is now sinking in to the various segments of policy making. Table 2.3 describes a stakeholder analysis on ground water legislation in India.

Table 2.3 Ground water management: a stakeholder analysis

Stakeholders	*Concerns/Perceptions*
Farmers	Adequacy, reliability and control in access to water
Local Politicians	Protect vote Bank
The Ground Water Board	Regulate Ground Water Withdrawals by licensing
Central Government	States to enact Ground Water Bill
SEBs, NABARD	Credit and electricity Restrictions
Academia	Credit and electricity restrictions ineffective Modify Ground Water Bill Institute Property Rights Focus on management rather than development Enabling Approaches
Multilateral Organisations	Institute Property Rights Secure Greater Co-ordination Focus on management rather than development
NGOs	Let go of regulatory approaches Demystify information

Thus, it could be argued that opposition from several stakeholders is holding back the enactment of ground water legislation. Pressure from NGOs, the World Bank and the academia is compelling the government to consider alternative approaches to ground water development and management.

The debate on irrigation pricing reform

Water being a state subject, irrigation prices are fixed by the state governments and vary from state to state. A major weakness is that water rates are not based on a volumetric basis so that there is little incentive for using water efficiently (Saleth, 1996). Further, these rates have not been revised for several years (Vaidyanathan, 1994 and Saleth, 1996).

Returns now account for less than 2% and 5% of gross and net returns respectively. Not even the costs of O & M (operations and maintenance) are covered by the prices. As percentage of productivity, water charges are only between .3% and 7.1% of the difference between the productivity of irrigated and unirrigated lands.

As a result, irrigation subsidies now amount to over .3% of India's GDP (World Bank, 1998). The net result is that water pricing has negligible decisions regarding 80% of the water use and allocation decisions in India.

Prior to independence, the British treated water as an economic good. Irrigation projects were treated as a commercial venture. Water rates were devised on the full costs of provision, including capital costs plus a return on capital, commensurate with the interest rates prevailing then in the London money market. The assessment and collection of water rates consisting of all costs plus a return on capital was strictly enforced.

In the decades of planning, however, irrigation pricing policy was influenced increasingly by the tendency to regard water as a social good. Its subsidization has been rationalized in public interest. This philosophy progressively became a convenience for protecting vested interests in water pricing and in particular for not revising water rates over time. Very infrequent adjustments became the norm and in some cases states did not adjust rates for several years, despite the hike in O & M costs as well as an increase in the support prices of major agricultural crops.

Academia also points out other weaknesses in the irrigation machinery. In states like Bihar and Orissa , the administrative machinery is so weak that the cost of administering it itself is higher than the accruals so that the task of collecting water dues itself had to be abandoned (Saleth, 1996).

At the same time, the revenues that are realized go into the state exchequer rather than the state irrigation department, providing no link between the irrigation expenditures and little incentives to improve the service. Not only are the State Irrigation Departments in poor health, but the poor quality of irrigation services lowers the productivity of irrigation. Expenditures on maintenance have been recognized as chronically deficient, resulting in progressive deterioration of the irrigation systems (Vaidyanathan 1994).

The Vaidyanathan Committee Report (1992) emphasized the need to price water to cover O & M costs and part of the fixed and capital costs; some segments of academia disagree; Saleth (1996), argues that there is a need to price water to reflect the marginal productivity of irrigation. The revision proposed by the Vaidyanathan Committee may recover costs of production, but would still not resolve the efficiency problem. The true price for water would emerge only when tradable rights in water are established and water is treated in the market like a tradable commodity. There is also pressure from the Multilaterals to 1) Reform the Irrigation Bureaucracy and 2) Form Water User Associations to raise recovery. Table 2.4 describes a stakeholder analysis for irrigation pricing in India.

Table 2.4 Irrigation pricing: a stakeholder analysis

Stakeholders	*Stakes/Impacts*
Farmers	Easy access to cheap water; protection of agricultural incomes Limited incentive to economize water use Suffer due to low productivity of irrigation
Political set up	Subsidise water in the interest of welfare
State Irrigation Department	Poor assessment and lax collection Low efficiency of collection machinery Limited Resource Generation Poor quality of irrigation infrastructure
Vaidyanathan Committee Report (1992)	Price water to cover O & M costs and part of the fixed and capital costs
Academia	Price water to reflect the marginal productivity of irrigation
Multilateral Organisations	Reform Irrigation Bureaucracy Form Water User Associations to raise recovery

There is some evidence that these pressures are now causing a shift in the policy approach to water pricing. Andhra Pradesh, Orissa and Haryana have now begun to revise their irrigation prices. The formation of water user associations is also receiving a renewed emphasis.

We now look at some comparisons with other countries.

Irrigation services can be financed by a wide variety of mechanisms: water pricing, based on demand determined consumption; irrigation services fees assessed with reference to irrigated area; general taxes levied without specific reference to irrigation services; implicit taxation though control over prices of inputs and regulation of the market sector; and supplemental income to an irrigation agency through other revenue generating activities (Small 1990).

A number of mechanisms have been employed world wide for better irrigation pricing. In Korea, Nepal, and the Philippines and at the tertiary level in Indonesia, resources are mobilised by water user associations through irrigation service fees. A similar practise is followed in parts of Thailand. In addition to mobilising resources directly from the water users, irrigation agencies in Indonesia, Korea and the

Philippines also rely on secondary income as an important source of funding for irrigation services. In the Philippines, secondary income is as much as 60% of actual O&M expenses. Indonesia and Nepal also use a form of land tax.

Korea obtains the highest rate of fee collection, over 98% , in part because agency staff attaches great importance to meeting the 100% target. Considerable effort is made in administering the fee collection process. In the Philippines, where the National Irrigation Administration switched from a financially dependent to financial autonomous body only in the past few years, the collection rate increased over the previous years and are now about 60% of the amounts assessed. In contrast, Nepal collects only an estimated 20% of fees due. This is seen as reflecting the lack of importance of fee collection to the irrigation agency , which depends on the central government for its entire budget.

India, then, will have to consider and explore the potential of alternative approaches to revamping the irrigation machinery. Possible options include financial autonomy of the state irrigation departments and a greater role of water user associations and irrigation management transfer: The potential of these approaches is discussed below.

Irrigation management transfer

The disenchantment with centralized systems of irrigation management has led several developing countries to auction the management of their irrigation systems; India being one of them. The lack of motivation and accountability of irrigation staff, heavy incidence of political interference, inadequate concerns for the needs of users have been major causes for the disenchantment.

The deteriorating financial performance of these systems in the face of mounting fiscal crises of the 1980s has led governments to consider alternative ways of improving cost recovery and financial performance. One approach has been to turn over the management of irrigation systems to farmers. Though specific objectives have varied from country to country, in general, these objectives have been to 1) increase user participation 2) improve information flow 3) establish a sense of ownership and in the process 4) build farmers incentives to improve the functioning of the systems.

At the same time, the success of management transfer in countries in Latin America and Southeast Asia has prompted a consideration of the potential of management transfer in India. Further, there has been pressure from the Multilaterals such as the World Bank and a considerable interest among the academia.

India's record with irrigation management transfer, has, at best been mixed. In some cases, as in parts of Gujarat, Maharashtra and Tamil Nadu, turnover has improved recovery in irrigation systems, brought about changes in the physical condition of irrigation infrastructure and improved accountability of irrigation staff (Kolavalli 1998). In another study, Patil and Lele (1996) have concluded that with the irrigation department managing operation and maintenance of dams and canal systems , and irrigation cooperatives taking the responsibility of distribution, operations and maintenance at secondary and tertiary levels, it would be possible to secure for farmers the advantages of both centralization (coordination and consistency) and decentralization (creativity and specificity) . This would lead to optimisation of water use and consequent increase in productivity and production.

Perhaps the greatest success has been met in the state of Maharashtra (Personal Communication, Shashi Kolavalli). This is attributable to close involvement of several stakeholders; a committed bureaucracy, a rich tradition of NGOs and a tradition of cooperative successes.

On the other hand, irrigation cooperatives in Gujarat and Maharshtra under the lift irrigation schemes have met with only limited success. Shah (1996) has ascribed it to the fact that they serve the agenda of the government rather than that of the farmers.

Another study (VIKSAT 1996) sought to evaluate the impact of management transfer of the State Tubewells in Gujarat under the aegis of the Gujarat Water Resources Development Corporation (GWRDC).

The State Tubewell Programs throughout the country have been known to be running poorly in comparison to private Tubewell operators and water markets in terms of the average area irrigated and the life of the Tubewell. In Gujarat, the GWRDC has been providing irrigation service to farmers across the state through the Tubewells owned by it. However, the performance of these state owned Tubewells is poor on account of the unreliability , frequent breakdowns and poor accountability of Tubewell operators. The high operating costs and the low rates of recovery of water charges from farmers has been a source of huge financial losses to the corporation. These pressures caused a move to turn over these systems to farmers. The VIKSAT study identified the following as the major bottlenecks to successful transfer;

a) the lack of organizational capacity among farmers for taking over the irrigation systems

b)the absence of technical know-how and poor involvement and training of farmers

c) Limited autonomy of the formed water user associations in fixing charges or expanding clientele, even when it would be necessary in the interests of ensuring financial viability

Lessons from other countries

There have been several successful efforts at handing over the management of irrigation systems to farmer's worldwide. Efforts have met with varying degrees of success, notably in Colombia, Indonesia, Mexico and the Philippines.

Colombia began the process of transferring management of irrigation systems to farmers associations as early as 1976. These associations drafted their own rules for operation, elected their own officials and encouraged farmer's participation in all forms of decision-making. Fixed and voluntary charges covered the O & M (operations and maintenance) expenses. The success of these turnover efforts is attributed to farmer training, continuity of staff and simplified operations and regular maintenance.

Indonesia followed suit with efforts at transferring canal irrigation systems less than 500 hectares in 1987. An important step that was taken in Indonesia was that these farmers associations were accorded a legal status. The early inclusion of farmers in design and construction and allowing a fair measure of flexibility in the former were crucial to their success. A study of two pilot turnover projects by the IIMI (the International Irrigation Management Institute) found the physical performance of the systems quite satisfactory. By 1991, more than 400 irrigation systems covering over 34,000 hectares had been transferred to farmers associations.

The budget crisis and financial crunch of the 1980s compelled Mexico to turn over its canal irrigation systems to farmers. A unique feature of management turnover in Mexico has been that it was carried out in stages. In the first stage, the operations and maintenance of lateral canals and drains was handed over to farmers. In the second stage, responsibility for full O&M of the main irrigation and drainage canals, including water scheduling and distribution is transferred to farmers with water charges raised to cover the full costs of O&M. The transfer is designed to reduce the government's responsibility and expenditures and to improve maintenance and sustainability. The objective is eventually to make the irrigation districts financially self-sufficient and improve water management. While earlier irrigation districts covered only about 30% of the O & M costs, the Mexican turnover seeks to make them financially self-sufficient.

Similarly, in the Philippines, after a training process for farmers, the National Irrigation Administration starts a three-stage transfer of irrigation systems. The process involves contracting with the water user associations to perform various levels of services and to collect O &M fees. In the first stage it contracts with the association to carry out O &M under its supervision. In the second stage, the association collects irrigation service fees and incentives are provided to achieve target collection rates. In the final stage responsibility is transferred to associations for all but the main storage, diversion, and conveyance works. Overall, the results have been favorable with the majority of associations fulfilling their contracts. The introduction of a catalyst in the early stage of their operation is considered as essential factor influencing the success of these organizations.

While there seems to be no general recipe for successful resource management turnover, it appears that number of factors play crucial role. These include according a legal status to enable these entities to act as autonomous bodies (Indonesia), flexibility in formation and operations (Colombia, Indonesia) and emphasis on training and preparedness (The Philippines, Colombia, Indonesia). Box 1 describes how bottlenecks to irrigation management transfer in India could be addressed.

Box 2.1

Removing Bottlenecks to effective Irrigation Management Transfer

Involve Farmers early
Develop organisational capacity
Build up on existing institutions
Provide Legal sanctity to Water User Associations
Simplify Legal Procedures
Provide Autonomy
Build up on existing Knowledge

Water markets

India has one the largest and oldest water markets in the world. As per one estimate, as much as 50% of the volume of all ground water in the country is transacted through water markets. In Gujarat, the volume of water transacted through water markets is estimated at Rs. 3 billion annually. Opinion is divided among members of the academic community on the equity and efficiency impacts of water markets. At one level, it is felt that they have positive equity impacts by improving access of water to those who do not have affordability of water extraction mechanisms. By directing water to higher value uses, water markets are also understood to have positive efficiency impacts. On the other hand, in the absence of a well-defined water rights structure, they are understood to promote aquifer depletion on the one hand and create a monopoly of water lords on the other. The Indian experience in water markets is different from that of other countries in the world, notably in Latin America in that the latter have regulated water markets and water markets work within the framework of well-defined water rights.

In several parts of the world, water markets have emerged as powerful mechanisms for improving efficiency in the use of water as also allocating water to its highest value uses.

A notable example is that of Chile. Three decades of profound reform in the water sector finally led to the emergence of the water code of 1981 with established tradable rights in water. Both surface and ground water rights are national goods for public use but private parties can acquire water rights in them and they can be sold or bought like any other good under the civil code. These rights are granted by the state without a charge except when there are competing demands for the same water in which case water is allocated to the highest bidder. The general directorate of water in the Ministry of Public Works is responsible for planning water resources and granting water rights. Much of the detailed work in distributing and enforcing the correct use of water falls to water user associations. These associations also collect fees for the construction, maintenance and operation of all irrigation infrastructure. About 3,00,000 water users are grouped into 4,000 water users associations.

The 1981 Water Code allows complete freedom to trade water rights of all kinds. One study reports on about 600 water transactions that took place over one-year period in 1993-94. The large majority was between farmers (94%), 3% between farmers and urban water supply companies and 1% between farmers and mining companies.

Water trading has created efficiency gains. Farmers sell only a portion of their water shares to water supply utilities and invest in water-saving irrigation equipment. As a result, they are able to maintain or increase their crop production using less water but more capital investment. The greater efficiency places less strain on the environment, because additional investments in water supply can be deferred. At the same time, a large spot market in which irrigation water is rented for periods of different duration has similarly provided a flexible instrument that enables farmers to use water in an optimal fashion.

Similarly, in Brazil, the Federal Structure empowers states to enact their own laws for inter-state waters. The focus of legislation in several states is in instituting and implementing a strong water rights and allocation system, strong administrative systems to enforce, measure, register, and administer water rights, and strong public information efforts to make the general public aware of the value of water and the right to its use. Mexico's Water law of 1992 established market-based transfers of water use concessions, subject to approval by the CAN, the regulatory body. The CNA regulates water transfers across sectors, basins and any transfers that might create adverse environmental impacts. Also as part of features of the law of 1982 , there is an attempt to decentralize and hand over management to water user associations that have the responsibility for operating and maintaining irrigation systems. Water rights are administered to irrigation districts and individual rights can be transferred within the district only, i.e., to individual farmers. The chief lessons from Mexico are in terms of creating market-based instruments within the limits of a regulatory framework in the overall objectives of equity, efficiency and sustainability.

Water markets have also developed in Colorado and California, though there are differences with regard to how the water markets are organised. In Colorado, water markets have evolved over 150 years with the heavy involvement of users and a limited involvement of the government. The judicial system has been used to maintain fairness and equity within the market. California has also seen the evolution of a highly regulated and centralised water market system that has developed largely in response to major water shortages precipitated by expanding demand, a lack of conservation practices and major drought.

Each of these experiences has mixed results to offer as well as lessons. However, the only way to move to a water rights structure is through gradual pilot testing and research and through legal innovation and modification.

Decentralisation: improving the supply of drinking water

Another shift in the policy environment now taking place in India is in terms of decentralisation. In 1992, the Constitution (73rd Amendment Act) gave responsibility for drinking water and sanitation to the Panchayati Raj institutions. The Gram Panchayats as the local level tier are now expected to be responsible for the choice of technology in ensuring the supply of clean drinking water, recovering costs and operations and maintenance of rural water supply and sanitation. This process still is in a very early stage in most states but Gram Panchayats are now almost universally implementing development programmes that are handed down to them by state and central governments (UNICEF-WWF, 1997).

However, there are three important qualifications here (Narain 1998); one, the impact of this legislation has so far been mainly on the political dimension of constituting village Panchayats and holding elections, while the real issues of the devolution of financial and other powers remain unresolved (Saleth, 1996). The State Finance Commissions are proposed to be set up to determine the sharing of resources between the state and local governments. One does not know what shape the formation of State Finance Commissions will take. In fact, the establishment of State Finance Commissions could be just an extension of the usual tangle of center-state fiscal relations; the states may be unwilling to let go of financial powers. Thus, for this legislation to be effective, it will have to be accompanied by the devolution of financial and other administrative powers as well. Second, the real issue is not that of decentralisation alone, but of an optimum level that ensures both accountability and performance at the local level (Narain, 1997). We need accompanying measures that ensure accountability as well. A third criticism is that a village Panchayat, which is an administrative unit, need not be the best unit for managing water that is done better at the level of the a hydrological unit such as a watershed or river basin.

The demise of traditional institutions

Through the length and breadth of India have existed a variety of local level institutions suited to local hydro-geological and social contexts for harnessing water. Several of these have been on the decline in response to changes in life-styles and the invasion of organized sources of water supply. An example is the Johads of Mandhana(Box 2).

Box 2.2 The Johads of Mandhana: the decline of an institution

The Johads of Mandhana are a very fascinating phenomenon. No one remembers how long they have been there but they know that they have been passed down from one generation to another. These are like depressions inside the earth where rainwater accumulates and to a casual observer, look like ponds. At one time, they were built largely to provide a source of water to livestock. Often, men would bathe in them, too. Women would even wash their clothes. When the houses were *kutcha,* women would desilt the *Johads* and take the mud for their homes. Thus, there was an in-built mechanism for maintaining them.

Today, the institution of the *Johad* is on the decline. *Pucka* houses have replaced *kutcha* houses. The availability of piped water has meant washing and bathing activities have to be performed at home. Men are more conscious of hygiene; since the *Johads* are a source of water for livestock, they refuse to bathe in them. The *Johads* are now only a source of water for the livestock. These provide a steady source of water soon after the rains and dry up after that. Some *Johads* do better than the rest. These are the ones on clayey soils or those located closer to a public tap where some recharge keeps them alive. The village has eight *Johads,* of which five were still a source of water when we visited the village.

Source. UNFPA 1998.

Another example is the *naadis,* seen widely in parts of Jodhpur, Rajasthan (Box 3).

Box 2.3 The *naadis* of Jur

An important trend in the Jud village in Jodhpur has been the decline of the *naadis* (the village ponds). The village has three *naadis* ; the main *naadi* is about twenty feet deep. There are two other *naadis*; one of which is about fifteen feet deep and the other one about five feet. They store collected rainwater, which lasts about six months. Till about ten years ago, the *naadis* were the main source of drinking water. The *naadis* have now fallen into disuse. This is because of several reasons. First, the villagers now have access to organized sources of drinking water. These sources meet the needs of villagers better and more effectively. They are now used only for meeting the drinking water needs of the livestock. Then, earlier there were customs and institutions that regulated the use of the *naadis*. For instance, urinating and defecating in the field was forbidden. There were penalties for violating these codes of conduct and the word of the elderly was regarded in high esteem. " Earlier, the villagers had regard for what the elderly said. Now, nobody cares", as one villager said.

Source. UNFPA 1998

Lately, however, there has been a renewed emphasis on the need for reviving traditional systems of water harvesting in order to meet the growing requirements of water supply

This emphasis has come from various segments; multilateral organizations (UNICEF-WWF 1997), NGOs (CSE 1997) and the academia (Singh 1996). A recent policy initiative has been in the city of Chennai where a notification urges all residential complexes to compulsorily construct water-harvesting structures on their rooftops.

Other institutional bottlenecks in providing drinking water

The provision of safe drinking water has important equity and development implications. On the one hand, unavailability of potable water in the desired quantities has implications for the quality of life in terms of the time spent in collecting water, on the other hand, the consumption of contaminated water has adverse impacts on human health and productivity.

In the event of inadequate access to water for domestic purposes, for instance, women and children are known to spend a substantial proportion of their time in collecting it. A recent study showed that a section of women in Delhi, Hyderabad and Ghaziabad spent on an average almost 4 hours a day simply in collecting water. Another study suggested that women in the Baroda region of Gujarat spent seven hours a week. It is important to consider the time and effort involved in this task in terms of lost wages. Besides, schooling and education of children suffer when forced to carry water over long distances.

Often any city with some form of water supply is considered "covered", though there may be widespread variations in individual access and availability. Data at a macro level hides the widespread inequities in water supplies; since most slums and low-income localities, for instance, receive only a fraction of the available water supplied. The Seventh Five-Year Plan it self admits that the official figures of coverage reflect neither the inadequacy of the water supplied nor the deprivation of the urban poor.

The concern for drinking water as priority is, in fact, quite recent. It is only the National Water Policy of 1987 that assigns the first priority to drinking water in allocating water among alternative uses. Once again institutional bottlenecks have an important role to play in hampering the availability of drinking water in the desired quantities at the right time. It has often been pointed out that Drinking Water supply has been entrusted to public utilities that lack often the resources as well as the expertise. Most of the water supply systems are outdated, have been installed several years ago and have failed to grow to accommodate the needs of a growing population.

Newer settlements have often been added to the existing towns and industrial growth centres, without adequate understanding of the capacity of the surrounding natural system to support the teeming numbers.

Investments are also hampered because of underpricing in the sector. As in the case of surface water projects, here, too, underpricing creates a dual handicap; on the one hand, it does not create incentives for efficient consumption of water and on the other hand, low accruals are a handicap to expansion, operations and maintenance.

Past efforts at expanding the supply of drinking water in rural areas have been carried out primarily through the NDWM (the National Drinking Water Mission). The NDWM was set up in 1986 with the objective of providing potable water sources to every village within a radius of 1.6 kms with the target of 40 lpcd (liters per capita daily). The major thrust of the drinking water supply program for rural areas has rested on the installation of hand-pumps. Latest data brought out by the Rajiv Gandhi National Drinking Water Mission suggests that 27% of the country's rural population, or 166 million, has no access whatsoever to drinking water. It is important to note, however, that when government statistics claim that a very high proportion of villages have been provided with safe drinking water, it merely implies that hand-pumps or stand-posts have been installed in these villages. It does not necessarily imply that water is being provided through these facilities or that the village community is utilising this water. Previous allocations for these schemes have been used largely for the initiation of new schemes while the maintenance of the existing schemes has been neglected; there being a divide between plan and non-plan expenditure with maintenance falling in the latter category.

The case for gender sensitivity

A study commissioned by the UNICEF in eight major states of India on the type of water source being used revealed that

a) the traditional open dugwell continues to be the primary source of drinking water in most areas for all purposes, including drinking
b) Over half the non-users of India Mark II hand-pump which has been installed extensively as part of the government's water supply programme say that the pump is located too far away for their convenience.
c) One of every three non-users feels that the hand-pump water tastes salty, looks rusty or smells medicinal.

The findings of the study seemed to point out that merely introducing new technologies /hand-pumps in villages would not be sufficient to change usage practices or to reduce the time and effort spent by women in water collection, as they continue to use traditional sources. The reasons for not adopting new water technologies and continuing with traditional practices suggest that these programmes have not taken into consideration the cultural context and the level of knowledge of local communities, specially women, while planning new technologies.

Improvements in technology and introduction of cleaner technology

It is felt that substantial savings are possible in the use of water in all the consuming sectors (industry, domestic and agriculture). Current irrigation efficiency is only of the order of 30-40 %. Unaccounted for water in domestic supply systems is typically 30-50%. Water use efficiency in the industrial sector in India also compares unfavourably with that of several developed and developing countries.

It is argued that even modest improvements in irrigation efficiency could have a large impact on effectively increasing water availability. To begin with, large savings are possible by simply improving irrigation management through better management by existing technology. On-farm water management is poor due to limited or non-existent field channels and watercourses. There is a pre-emption of water by head-end farmers, a trend that is exacerbated by the absence of communal structures such as water user organizations. Sprinkler and drip irrigation systems, while increasing in use, are still expensive and have to be heavily subsidized.

At a more fundamental level, the bottlenecks to effective technological improvement could be traced to the perverse incentives generated by the prevailing institutions (Saleth 1996). For example, it is unrealistic to expect conjunctive use of surface and ground water when surface water is priced very low relative to the costs of extracting ground water. In Chile, the introduction of a water rights structure not only led to the adoption of water-saving technologies, but also fostered research in this field.

In the industrial sector, once again, there is substantial scope for savings. The industrial demand for water in 1990 is estimated to have been of the order of 15 km^3, just about 2.7% of the total water demand. This is expected to double to 30 km^3 by 2000 and quadruple to 120 km^3 by 2025. Of the total water demand projection of 1050 km^3 by 2025, the share of industrial demand would rise to around 11%. It is important to note that while the present share of industry in water demand is rather small, the inefficiency with which this is used is rather high in relation to many other countries. For instance, industrial GDP/Unit of water withdrawal in India is only $ 5 per m^3; this compares quite unfavorably indeed with not only other developed countries such as Japan and Sweden where the corresponding figures are $25 per m^3 and $32 per m^3 respectively, but even in developing countries such as Argentina where the figure is around $ 20 per m^3 (Chitale 1992).

In a number of cases in developed and developing countries, it has been demonstrated that regulation combined with tariff and pricing policies has resulted in savings ranging between 20% to 30% or more. In industrialized countries, demand for water does not increase with industrial output due to changes in processes, technology, and mix of industrial output and increased recycling of liquid effluent. In some Organization for Economic Co-operation and Development (OECD) countries, industrial water use in the year 2000 will be 50% less than it was five years earlier. In manufacturing industries in the United States, similarly, the number of times each cubic meter of water is used has gone up from 1.8 in 1954 to 3.4 in 1978. In the United States, between 1985 and 1995, industrial water withdrawal per dollar of value added has declined from .76m^3 to .54m^3 (Bhatia, Rogers, Briscoe, et al. 1994). Thus, as industrial demand for water grows, the challenges would be in terms of improving water use efficiency in the industrial sector in the years to come so as to reduce the stress on water withdrawals.

A major weakness in the policy framework is that even when pollution fees exist, they are so nominal as to give industry little incentive to install less polluting technologies. At times, the cost of complying with environmental standards is higher than the cost of non-compliance. For instance, there have been cases where the costs of installation and operation outweigh the penalty associated with non-compliance. As discussed earlier, the small-scale sector feels particularly constrained in terms of access to resources and cleaner technologies.

Similarly, in the domestic sector, there is a need for leak detection programmes and improved monitoring and metering in urban water supply systems. The lack of financial resources is a factor that hampers the ability of municipalities to improve their systems as well. Further, among the Urban Water Supply Systems, very few are structured as independent commercial entities; the government absorbs losses so that there is little incentive even to improve performance by technological upgradation of systems.

Municipalities are not adequately tested against discharge, discouraging investment in sewage treatment. Inadequate monitoring and regulation of pollution exacerbate this problem. As in the case of the state irrigation departments, there are little incentives for the municipalities to improve their performance. Some efforts in this direction have been made through the 74th Amendment to the Constitution of India. A discussion of related issues can be found in the chapter on urban solid waste management.

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3 Air

Introduction

Air is a resource to which there is free and open access for all. Air quality, however, is being adversely affected by activities in certain sectors, the most significant and the most polluting of which will be covered in this chapter. As a result, better quality air is rapidly deteriorating into a resource to which those in urban areas especially, may not have all that much access to the sectors* are as follows–

i) Urban transport sector
ii) Industrial sector
iii) Thermal power plants
iv) Indoor air pollution

The first section looks at the stakeholders in the area of air pollution mitigation, control or prevention policy, focusing more on the government bodies and their respective mandates. The second section gives an overview of the problems that characterise the different sectors. The third section pertains to other issues that apply across the sectors, some of which are fairly new concepts in the area of environment, such as clean technologies and public interest litigation. There is a final summing up of all of the issues in the concluding section.

Stakeholders

Air quality problems are distributed among different sectors. The stakeholders involved also belong to different sectors. However, the nodal bodies in the set-up that emerges are the Ministry of Environment and Forests (MOEF) and the autonomous body under this ministry, viz., the Central Pollution Control Board (CPCB). Pressure to adopt and enforce pollution control and/or prevention strategies is generated outward from the Environment Ministry to the other concerned ministries as well as to industrial enterprises, the power sector, etc. (Personal Communication: MOEF, TERI).

The government bodies that form this set-up are as follows–

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* The sectors chosen are similar to those in the earlier CRIEPI/TERI report that dealt exhaustively with the current air pollution scenario in India. This chapter will draw heavily upon that report while trying to go beyond the pressure-state-response model used there.

Ministry of Environment and Forests - (MoEF)

MOEF is the main stakeholder as it is the nodal agency for dealing with all policy matters pertaining to the environment. It has the authority to issue legislation that would be enforced once the Bill is passed by Parliament. All foreign aid - whether in the form of technical assistance or grants - as well as technology transfers, for environment related projects are channeled through the ministry. As it is the central agency, its mandate can be clearly seen through its interaction with the other concerned bodies.

Central Pollution Control Board (CPCB) and the State Pollution Control Boards (SPCB) in the states and Pollution Control Committees in the Union Territories.

Central Pollution Control Board and the State Pollution Control Boards were constituted under the Water (Prevention & Control of Pollution) Act, 1974. CPCB is an autonomous body that comes under MOEF. The Pollution Control Boards are the authorities with the statutory obligation to implement the legislation issued by MOEF. CPCB initially dealt only with the implementation of the Water & Air (Prevention and Control of Pollution) Acts, 1974 and 1981 respectively.

The Boards have been empowered by the Air Act as well as the Environment Protection Act, 1986 to see to the maintenance of the Minimum National Standards (MINAS) for effluents from industries, power plants and refineries. CPCB provides the technical input for MOEF and the SPCBs. It also provides the technical input for the courts when it comes to pollution related public interest litigation (PIL).

CPCB receives funding for its projects from the Environment Ministry and for its non-Plan activities (i.e., activities apart from those laid down in the ongoing Five Year Plans) such as capacity building, from external funding agencies.

The organisational structure is such that there is a network of the Boards at various levels across the country. CPCB has 6 zonal offices to coordinate the working of the State Pollution Control Boards (SPCBs) and the SPCBs have their headquarters as well as regional offices. The network goes right down to the district level. However, in case of the SPCBs, the administration (senior appointments, enforcement, etc.) is under the respective State Governments.

Other central ministries

Ministry of Surface Transport (MoST)

The subjects allocated to MOST are administration of the Motor Vehicles Act, 1988, taxation, and research and development for roadways.

Ministry of Power (MoP)

It is responsible for the development of electrical energy in the country thus, all matters concerning energy conservation & energy efficiency pertaining to the power sector. Funds are allocated to the Energy Management Centre for energy conservation measures.

Ministry of Industry (MoI)

With the New Industrial Policy, it has become imperative to harmonize industrial development with the environment & the need to conserve natural resources by adopting appropriate technologies. The Department of Industrial Policy & Promotion, under MOI, has set up an Environment & Technology Desk. Its functions are to monitor pollution control measures adopted by the industries to ensure adherence to the environmental guidelines issued by MOEF. MOI has set up a lot of forums for trying to promote technology development - a lot of them in collaboration with external funding agencies.

The Department of Industrial Policy and Promotion has also taken other steps to regulate industrial performance along the lines of environmental considerations such as regulating the location of industries, discouraging the use of CFC based refrigerants, etc.

Ministry of Petroleum and Natural Gas (MoPNG)

The mandate of this ministry, other than issues of exploration, supply and pricing of petroleum and natural gas resources, extends to planning, development and control of and assistance to all industries connected to the ministry.

It also conducts research in the field of oil conservation and has begun to give a lot of importance to information dissemination on the methods of conservation that can be followed by the general public as well. The Petroleum Conservation Research Association (PCRA) under the ministry carries out these activities. It has also conducted numerous energy audits.

Ministry of Non-conventional Energy Sources (MNES)

The renewable energy programs received a major boost with the creation of a full-fledged Ministry of Non Conventional Energy Sources (MNES) in 1992. The Ministry provides budgetary resources of the Government of India for research and development, demonstration and rural oriented extension programs. Besides, it extends institutional finance through the Indian Renewable Energy Development Agency (IREDA) and financial institutions for commercially viable renewable energy projects with private sector participation and external bilateral and multilateral funding. It also promotes private investment through fiscal incentives, tax holidays, etc.

In the rural areas, several renewable energy programmes/projects are being implemented to meet the growing demand for energy and to facilitate a more sustainable use of natural resources. Since cooking accounts for nearly 90% of the total energy needs in the rural areas, some of the major renewable energy programs have focused on the cooking energy system at the household level. These include the National Project on Biogas Development (NPBD), the National Program on Improved Cookstoves (NPIC), which are the programmes that will be discussed here as they are seen as the answer to dealing with problems of indoor air pollution.

Ministry of Urban Affairs and Employment (MUAE)

Apart from policy formulation & monitoring programmes in the areas of housing, urban poverty alleviation and urban development, MUAE is responsible for planning and co-ordinating urban transport matters. However, this has only recently been added to the Rules of Business of the Ministry, and it is still in the process of managing to integrate this new responsibility into its agenda. It was handed over to the Ministry as recently as 1996. Transport is thus now divided between the Ministries for Water, Surface Transport and Railways. Until now, the transport related activity of MUAE has been restricted to funding studies for feasible transport systems. Most of the state governments are in a difficult position as far as finances are concerned. Nevertheless, they want to develop good urban transport systems.

The other sense is which the mandate of MUAE can be seen as being relevant to the issue is because of its focus on urban development. It is possible to examine the opportunities in "alternative" urban development. For example, IDSMT (Integrated Development of Small & Medium Towns) is a scheme within this ministry. Some of the relevant urban development bodies under MUAE are ☐ Central Public Works Department, Delhi Development Authority, National Institute of Urban Affairs, National Capital Region Planning Board and Town and Country Planning Organisation. MUAE also assists State Governments with their urban development programmes.

A note on the other stakeholders

The other relevant government bodies are the Planning Commission and the Department of Economic Affairs, Ministry of Finance, which deal with the budgetary allocations for different sectors. They provide the conduit for all external aid and internal financial allocations that will feed into the policy related activities each concerned government body undertakes. Research and academic institutions such as TERI (Tata Energy Research Institute), NEERI (National Energy and Environment Research Institute) and the IITs (Indian

Institutes of Technology) are being given increasing importance in the formulation and implementation of policy. While developing standards, to name a particular activity, they are involved, along with NGOs (non-governmental organisations), and their experience and information is incorporated. Other stakeholders can be broadly said to be the judicial bodies, external funding agencies and industry associations (such as Confederation of Indian Industry).

Legislative framework

In this section, the laws that have affected air pollution, mitigation, control or prevention are listed, to be followed by a look at the working and efficacy of the framework. The impact on air pollution issues is direct in the case of laws like the Motor Vehicles Rules or the Environmental Impact Assessment Notification. In the case of laws such as the Water Act, or the Policy Statement for Abatement of Pollution, it is more indirect.

The legislative landmarks relevant for the prevention of environmental degradation, especially that of air quality, are as follows–

- Water (Prevention and Control of Pollution) Act, 1974
  (The Pollution Control Boards were constituted under this Act.)
- Air (Prevention & Control of Pollution) Act, 1981
- Environmental Protection Act, 1986
  The Gazette Notification of January 3, 1989 issued the first amendment rules to the EPA, 1986 which stipulated the particulate emission levels for TPPs. MOEF, in consultation with CPCB, has developed emission standards for specific categories of industries. These are notified under the EPA, 1986. Source-specific emission standards have been laid down as Minimal National Standards (MINAS).

The other laws that have affected, directly and indirectly, the state of ambient air quality –

- National Highway Amendment Act, 1956
- Central Motor Vehicles Rules, 1989
- Public Liability Insurance Act, 1991
- National Conservation Strategy & Policy Statement on Environment & Development, 1992
- Policy Statement on Abatement of Pollution, 1992
  (This was truly a landmark event that acknowledges the significant role that NGOs & public citizens can play in managing the environment and represents change in the stance of the Government of India. It is an attempt, by the MOEF, to show that the Government is trying to change its image to encourage more effective interaction, and to facilitate the creation of a more

enabling environment as far as the adoption of cleaner technologies, or keeping to standards and pollution norms is concerned. It represents the change in environmental policy in India from that of a more regulatory nature to a form that makes puts its point across but more through incentives than through threats and inspections.

- Environment Action Programme, 1993
- Environmental Impact Assessment Notification, 1994
- National Environment Tribunal Act, 1995
- National Environment Appellate Authority Act, 1997

The process of formulation

The laws are predominantly issued by MOEF. CPCB can also issue guidelines despite being the implementing body mainly, after being given the authority from MOEF. Clearance also has to be taken form the Law Ministry. The CPCB provides the required processing of information and technical input regarding appropriate emission standards and permissible levels of pollutant in the ambient air, etc. that goes into the laws.

Introducing environmental norms and legislation

To initiate this process can be a challenge as environmental concerns are additional to those of promoting economic and social development that have dominated policy until now. The example from Japan referred to in Box3.1 is, in fact, one that managed to overcome the hurdles in a relatively short time frame of 5 years. In India, the process of first tabling, discussing and then passing the bills in Parliament can take a long time, and are subject to political issues that may take precedence or disrupt the running of the process.

Box 3.1 Introduction of environmental legislation

In Japan as well there was the usual difficulty in submitting the initial environment and pollution related bills to the Diet. In 1955, the Ministry of Health and Welfare of the national government first tried to get a *Living Environment Pollution Control Standards Bill* passed in the Diet. The industrial sector and the related ministries opposed its introduction as they saw it as anti economic development and attached greater priority to matters of the economy. Over the following years, this ministry tried to introduce it again but failed, although the state of pollution was worsening with energy consumption increasing. It was not until the Ministry of International Trade and Industry (MITI) took up the matter with the point of view that its solution was essential not just for maintaining public health but also the healthy development of industry in the long run. Finally, the *Law Concerning Controls on the Emission of Smoke and Soot* was enacted in 1962 as a result of the working together of the two ministries.

Source: Pollution-Related health Damage Compensation and Prevention Association, 1995.

The procedure that laws are subjected to before they actually see the light of day is therefore a time-consuming and tedious one. The five-member Environment Appellate Authority set up by the National Environment Appellate Authority Act, 1997, consisting of a Chairman, Vice-Chairman, and 3 members, is expected to enable quick and speedy disposal of cases relating to the environment.

An integrated body of legislation

Laws pertaining to management of pollution issues are still very fragmented, as there is no umbrella legislation that unites all the concerns. The lack of a comprehensive form for environmental legislation impedes enforcement of the law as well as coordination of the activities of various government bodies under the law (MOST official).

Incomplete legislation

This is one of the major causes for problems in the enforcement of laws. A MOST official interviewed lamented that a significant cause of pollution could be eliminated from the roads as they have been in developed countries if maintenance of the vehicle were made mandatory. This is an aspect not covered in the Motor Vehicles Act. Highly polluting vehicles, if caught, cannot even be impounded, only allowed to return on to the roads after having paid an insignificant fine.

Legal loopholes

Gaps in the framing of the laws leads to the presence of loopholes that may be taken advantage of, especially in a culture that lays more emphasis on rights than on duties. There are certain "vehicles" which are not covered under the Motor Vehicles Act, and thus emission standards, etc. are not applicable to them. These are locally manufactured vehicles that that attach water pump or other engines on to the automobile chassis and are running on the roads of some states (Gujarat, Haryana).

The sectoral approach to air pollution

This section will deal with each of the main sectors responsible for air quality deterioration, elaborating on their particular features and giving a feel of the problems associated with them.

Urban Transport

Vehicular emission has been identified as one of dominant causes of air pollution. It has a particularly deleterious effect on urban air quality. The connection between the urban transport scenario and urban development is also obvious although its potential has not been explored at the policy level or at the level of co-ordination with the relevant ministries, viz., MOST and MUAE.

Recent growth in the transport sector

MOST has been trying to cope with the near explosion in the transport sector in the last decade. The situation now is such that the extent of road development in the urban centres is not commensurate with the increase in vehicular population. The population figure has shown an almost 100 per cent increase since then (see Box __). This results in traffic and decongestion and affects the urban atmosphere very severely. Add to this the fact that the economy is still experiencing a very fast rate of growth that implies greater cargo movement that in turn implies more pressure on the roads. Roads are the preferred medium for cargo movement as the routes are more flexible though the impact is more polluting. Thus, a further expansion is what the near future brings.

Financial constraints

Although under the Ninth Plan there were a lot of recommendations for urban transport. However, according to the relevant government departments, this has not been accompanied by a corresponding increase in budgetary outlay. Also, most of these recommendations have not been entirely accepted by the concerned agencies, like the transport groups within MUAE.

Road development, for instance, requires a great deal of funding. GOI investment is not sufficient. The MOST has been trying to attract private funds for this as well. Not only are there fiscal incentives built into the Income Tax Act, especially for companies or financial institutions providing finances for infrastructure, there are other incentive in the form of tax holidays, etc. The road sector has been declared an industry to facilitate commercial borrowing. Nevertheless, from the perspective of the government, private sector investment has not come up to their expectations.

Setting standards

The process of setting up standards is a long drawn one and has taken shape gradually as the pollution menace grew and more and more air pollutants began to be taken into account and monitored. Benchmarks have to be set up for the level of pollution and these would have to be different for different pollutants. These benchmarks have come out gradually. Before they were set up any vehicle was allowed to come on road without any specific emission control measures being applied to it.

The first emission norms were introduced by MOST in the Central Motor Vehicles Rules, 1989, that introduced nationwide emission levels for both petrol & diesel engine vehicles. These were fairly liberal in comparison to the norms as they exist now because at that time we were in the process of identification of various emission issues/levels for vehicles. These norms have been reviewed and made up-to-date. A continual self-improving process has been established as of now to enable a continual re-evaluation of the norms. As a result today the position is such that we are in 1998 all the emission norms that are to be adhered to even for the vehicles that are not as yet on the road but are supposed to come out, have already been identified and notified. The next set of emissions will come into force on 1 April 2000. Any vehicle manufactured thereafter, if it does not meet these norms, will not be allowed to continue on the roads. Fuel requirements are another factor that is of great significance ☐ these have to be set and adhered to. Thus, fuel quality is also of relevance and has been dealt with in the norms for the year 2000. These are referred to as the Euro 2 norms.

Europe is now at the stage where it is going in for Euro 3 and India is going in for Euro 2 now.

Comparisons with Europe

A senior official within MOST who was interviewed compared the current situation in India to that existing in Europe. The conclusion drawn was that the two situations are, in the first place, very difficult to compare. Europe, of course, has environmental concerns very different to those of India. The technology available is very advanced. India is still some way from making a switch of that kind. India may not be that far behind though. MOST claims that by the year 2005, India will be as advanced as Europe in this regard. Although it must be remembered that the road system in Europe is far superior. That counts for reduced stress on the vehicle. Traffic speed is also closely monitored. It is not that European standards cannot be pursued in India. It just has to be done at a pace that will allow everyone to adjust the industrial sector especially. To get closer to Euro 3 norms, the industrial sector will have to make huge investments. European countries can, however, afford to switch over to new technology without much investment but that is not the casein India.

Stakeholder involvement in setting standards

Incorporating all stakeholders is a procedure that requires a great deal of co-ordination, etc. Coming out with these emission norms has to be a cumulative effort. That, according to the view of those within MOST, is the key to effective emission norms, and will assure maximum cooperation and adherence. There has to be dialogue with the automobile industry and their capacity for carrying out cleaner production as well as production of cleaner vehicles has to be established. The input of research bodies and other relevant stakeholders is also required and this is facilitated through the Environmental Norms committee under MOST that meets on a quarterly basis and includes all the stakeholders. Attempts have also been made to obtain and use the feedback on the latest technology applications as well as "best practice" solutions from abroad and within the country □ to the extent they are applicable in India. MOST also relies on MOEF and CPCB for suggestions and input.

Based on recommendations from CPCB, the emission standards for new vehicles effective from 1/4/96 were finalized. Fuel quality standards have been specified for diesel and petrol engines. Refineries would have to meet these standards in a time-bound manner.

A multiplicity of agencies

This is a sector where the operation of a multiplicity of agencies can be seen which impedes an integrated approach to tackling any problem. For instance, the bodies involved in this sector would include the Directorate of Industries (small & large scale, also state level), the Transport Department, Development Authorities and municipal bodies which provide the required infrastructure. The Traffic Police are responsible for vigilance & enforcement and the bodies responsible for road construction and registration of vehicles also need to be taken into account.

Since it has had urban transport added to its mandate, one of the main efforts of MUAE have been to change this situation. The proceedings are still in the very preliminary stages, for the setting up of an integrating body - Unified Metropolitan Transport Authority - that will lay emphasis on the transport sector in urban areas. The irony is that although there are a number of organisations, a lot of them suffer from the problem of being understaffed.

Alternatives for the transport scenario

MUAE's focus is also on the development of transport alternatives. An alternative option being explored is, for instance, the Delhi Mass Rapid Transit System. Due recognition is given to the fact that however effective the promotion campaigns for efforts of this type might be, an adequate response to the building up of the system can take place only if it really provides a viable alternative. For instance, importance will have to be paid to the interchange points - i.e. change points from rail to road. The interlinkages have to be well developed or else the idea will fail, as did that of Ring Rail earlier ☐ a rail system along the periphery of Delhi city. The status as of now is that the Union Government approved the Delhi MRTS Project and the loan agreement with OECF (Japan) has become effective. However, every city cannot have an MRTS. There has to be requisite lower limit as far as traffic load, investment, etc. are concerned. It is for these urban areas that alternatives provided by alternative models of urban development are applicable.

Alternative fuels such as Compressed Natural Gas (CNG) and mechanical controls such as catalytic converters are also other options explored. There have been efforts to distribute CNG kits. These efforts also run into problems. In the case of CNG kits, for example, their introduction in Mumbai and Surat have shown encouraging results, but they have not worked too well in Delhi. A problem is that the dissemination is possible on the basis of which areas the pipeline passes through. At this point, there would have to be coordination between MUAE and MOPNG.

The major bottleneck for the transport sector

There are ongoing efforts to take care of the future emission problems. However, one of the most serious problems is rooted in the present situation. The most serious threat from the urban transport sector is due to the on-road vehicles. There is a heterogeneous population of vehicles on the road and the danger is due to the older vehicles. They have older, less efficient technology installed. The Central Motor Vehicles Rules in fact make no distinction for the age of the vehicle. Should the norms for older vehicles be less strict or more so, since theirs is the more polluting influence? Awareness campaigns to bring this issue out into the limelight have been started. The aim is to try and help the public realise their role of maintaining their vehicles, which could substantially reduce the polluting impact of this sector.

Role of industry

In this respect, the industry has also been targeted in order to communicate the responsibilities it should have. The role of Automobile industry as seen by MOST is that they are very negligent as far as post-sale activities are concerned. The number of authorized service stations is not all in proportion with the number of vehicles manufactured. Even if there were a willingness to take care of maintenance problems, there are inadequate infrastructure facilities to do this with. These are issues of responsibility that are being ignored.

Scope for capacity enhancement

From within the government as well, there is scope for improving the calibre of at least some of the personnel. The ministries do not feel the need to staff experts as they have access to the best of research material within the country and without and to the resources of CPCB. However, government officials have expressed a need for some upgradradation of the staff capabilities as well.

Industrial sector

Industries are responsible for a large proportion of the environmental degradation and overuse as well as misuse of natural resources. However, the trend is changing fast within this sector. The reasons are not all an increase in environmental consciousness, although that is a causal factor.

Pressures on industry

Industries face tremendous pressure to be more clean in their production or at least to have better arrangements for housekeeping in the factory. The pressures are as follows:

- There is tremendous resource shortage. There are now problems of a lack of availability of water and power. Thus production processes have to be such that they are more efficient. Ironically, the infrastructure problems have forced the new environmental friendly orientation.
- Heightened market sensitivity to these issues is such that demands are for products that are making some contribution to the global drive for saving the planet.
- Also, there is a pressure to be cost-effective. This is turn is prompted by the need to be competitive as well as have production process that are sound in the economic sense, in the long term as well.

Response of the industry

They would react to legislation or to change in the pricing structure. The trend has been to have more measures that are of the regulatory type but now, the Government is veering towards incorporating more measures such as fiscal and financial incentives.

Industry is beginning to track its own performance. Internal changes have begun to be made. The approach taken by the Confederation of Indian Industry (CII) supports measures such as better housekeeping within the factory that amounts to greater resource efficiency, and saving and energy efficiency in simple ways as well.

There are attempts to achieve this across a number of similar industrial units, i.e., within clusters of industry. This applies especially to small-scale industries (SSIs). TERI, for instance is exploring the possibilities of working on small industry clusters that can network among themselves and share experiences or knowledge of best practices. The working of industries should be like that of natural ecology, where there is no wastage. It is like a closed loop. The waste produced by one unit is raw material or a resource of some value to another unit.

ISO 14000

Standards like ISO 14000 promote such self-assessments on the part of industrial units. These are worldwide standards with worldwide connections. In India they are enforced through the Bureau of Indian Standards. There is no system of it being enforced as such. It is like an added qualification that a company can have. In the case of ISO 14000 the focus is on setting targets on setting out the best possible procedure in terms of energy efficient production processes and management practices, and then of achieving them. The set up ensures that targets are set again to repeat the cycle and that these targets are more stringent than the earlier ones. What is established is a continual, self-improving cycle. ISO 14000 certification has even been made a requirement in some of the trade sectors and the government has also begun to give incentives to encourage this form of an exercise.

TERI Eco-rating

TERI has launched a different form of a self-assessment exercise for corporate bodies that can be seen as perhaps being complementary to ISO 14000. It is referred to as the eco-rating system and is used as an indicator for the environmental performance of the operations of a concern and can be used as an internal monitoring and feedback mechanism. It is entirely voluntary as an exercise with no compulsion to publicise the results. The implicity pressure to publicise is in fact present from the market and not form TERI as being "clean" is a very good publicity tool. Even if the results of the assessments are not very favourable, what is evident is a desire to change for the better. There is also a business risk consideration, in the event that stakeholders might incur losses due to legal action or adverse publicity. One of the salient points of difference between eco-rating and ISO 14000 is that the eco-rating is appropriate for concerns that have already been established.

The more polluting industries

In the industrial sector it seems that polluting capacity is inversely proportional to the size of the enterprise. The large scale industries...

The performance of industries has been mixed in the recent years. The large-scale industries have done a lot of good work. Their performance, as far as complying with standards, etc. is concerned, is improving considerably according to the experience of CPCB as well as TERI. These are issues of responsibility that cannot be ignore.

It is small & medium scale industries that are the problem. For them, the standards are meaningless for they have neither the information nor the infrastructure to adhere to the standards. There are 3 million SSIs that are lacking in the capital and technical expertise that can help them to set up cleaner technologies (Source: CPCB). The technologies have to be demonstrated. The owners have to be told that these are there for them to adopt.

It is part of the CPCB's pollution prevention plan to demonstrate these technologies. It funds the adoption of these technologies. This has been done, for example, for stone-crushing machines. MOEF, the World Bank and UNEP also fund efforts of this nature.

However, the efforts on this front need, perhaps, to be stepped up as these smaller industries as such do not have sufficient infrastructure and to some extent are surviving due to the nurturing treatment of the government. If the sector is given that protective advantage, then it should be also be given certain regulations and controls however large and unorganised a sector it may be.

(Air) Pollution Control Equipment Industry

Industrial sector consumes about 50% of the total commercial energy. It is, however, not only a consumer but also a producer of energy-saving technology. Air pollution control equipment is classified under High-tech industries. Most of the existing units have collaboration with reputed firms. Some units have also taken steps to upgrade their technology by introducing elements with a view to have better energy management, less maintenance, less operating cost, etc. With the stringent environmental control standards that are being enforced for the various industries, air pollution control equipment industry has assumed great significance in the country. Therefore, there is urgent need for joint ventures.

Policy on location of industries

Location policy: there is no requirement of obtaining industrial approvals from the Central Government (except for the industries under compulsory licensing) for locations not falling within non million-plus cities. In respect of industries to be located in these cities, industries of a non-polluting nature such as electronics, etc. may be located within 25 kms. periphery of urban areas. If they are still to be located there a clearance has to be obtained. Other industries are permitted only if they are located in Industrial Areas designated prior to 25/7/1991.

One of the seminal measures recently taken up by CPCB is preparation of a District-wise Zoning Atlas for siting of the industries. Proper siting & planning of industries & industrial estates are useful preventive instruments to ensure sustainable development. Thus, this Atlas will identify suitable areas based on environmental considerations for planned industrial development in the country. In the first phase, 19 districts have been chosen from across the country distributed in 14 states. Basic work in 17 districts covering 12 states has been completed & publication of the Atlas is in an advanced stage. Industries would have to be consulted before they set up locations. The plans are prepared keeping in mind the pollution loads of the areas concerned & the proximity of water bodies, natural reserves, etc. (CPCB, 1995; MOI, 1996-97)

This is a concept that, in the long term, has the potential of being one of the most important policies for combating pollution at the source. Also, it would dictate the course of urban & industrial development. Keeping this in mind there has been some liaison activity on this front with the Ministry of Urban

Development though the potential that lies in the possible links has not really been tapped.

Government incentives

MOP is the nodal body as far as energy conservation measures in industry are concerned. Some of the major government initiatives towards this direction are as follows–

- Depreciation allowance at 100 per cent in the first year on certain energy saving devices and systems.
- Certain energy efficient equipment is exempt from the payment of excise and/or custom duty, and reduced custom duty is applicable on specified equipment/devices used in the industry.
- Soft loans from financial institutions for technology upgradation and introduction of energy conservation measures.
- Subsidies for consultancy and training in the areas of energy management and conservation.
- Strengthening of Energy Management Centre for coordinating information dissemination, and strengthening of National Productivity Council, Technology Information, Forecasting and Assessment Council and other organisations.
- The Technology Information Centre has been set up where the operative organisations are the Department of Industrial Policy and Promotion, the Indo-European Commission Industrial Cooperation Programme, Confederation of Indian Industry, among others.

(Mohit Dua, 1998)

Thermal Power Plants

Environmental appraisal requirements

There is a fairly rigorous schedule that proposals for TPPSs are subjected to before they take shape from the planning stage. Environmental appraisals need to be submitted at three stages at the stage of project approval, another at plant commissioning and yet another when the plant is finally set up. The environmental appraisal study report is submitted to Power Ministry but ultimately requires the approval of the Environment Ministry.

Legislative support

The legislative support for these lies in the Gazette Notifications issued by the MOEF as well as the Environmental Impact Assessment Notification.

- Amendment Rules to EPA, 1989: Gazette Notification of January 3, 1989 issued 1st Amendment to Environment Protection Act, regarding particulate emission levels for TPPS.
- Gazette Notification from MOEF, 1997 - no power house beyond 1000 kms. from the coal source will be allowed to burn unwashed non-cooking coal. There are stipulations for the ash content to be reduced from the 40% characteristic of Indian coal, to 34%.

  This law, however, is not very adequately framed and finds itself in the middle of a controversy. The framing of the law is incomplete, as it does not specify who is responsible for the washing - the power plant or the mine sector. Also, the resultant waste of coal due to coal washing procedures, and the comparatively little energy saved considering the superior efficiency of installed electrostatic precipitators has not been addressed well enough.

- Environmental Impact Assessment (EIA) Notification, 1994

  EIAs were made mandatory for 29 categories of projects, both in public & private sectors. To ensure public participation in the EIA process, public hearings were made mandatory for these projects in 1997. Submission of an environmental statement by the polluting unit to the concerned state pollution control board was made mandatory in 1997 when MOEF amended the EIA Notification. Thus, Environmental Impact Assessment for power plants and clearance from MOEF is mandatory, Recently, the Central Government has delegated this power to the State Government for certain categories of power plants.

Greater popularity of TPPs

With the hydrothermal capacity mix changing such that the share of hydro capacity is declining as TPPS, the power sector and its compliance with the regulations needs to be monitored very carefully. This trend of giving greater emphasis on TPPs as opposed to other alternative sources is due to the fact that these have a shorter gestation period. This is a question, therefore, of quicker answers to the demands of a developing country as opposed to longer term considerations for the environment.

Technological gaps are being rapidly closed. Most ash precipitation systems now have an overall efficiency of almost 99 per cent (World Bank/TERI Report, 1998).

Alternatives

Switch from coal to natural gas. The use of natural gas in TPs is an indicator of cleaner technologies fopr pollution abatement at the source. The introduction of this cleaner tehcnilogy in India was npt fpr environmental reasons initially. Gas turbine technology has an advantage because the boilers designed for coal powered power plants are based on the specific coal characteristics and are absolutely project related. This does not apply to gas turbines. Also, gas turbine technology is more efficient. These are the advantages that were recognised when this technology was introduced in India. It is only later that the question of gas turbine being a clean fuel technology came in. Clean fuel technology is a relatively new concept in India although in Europe and other developed regions, this is one of the basic requirements by environmental law- "The introduction of this technology, despite this, -was opposed by concerns like the National Thermal Power Corporation and the Central Electricity Authority in the beginning on the basis that in a country rich in coal resources, this would be a defunct technology. The trend of thought was not at all on environmental lines at the time. This change has taken place only very recently in India. The technology was finally General Electric (the company trying to promote the technology in Planning Commission. The Commission had no choice but to go in for this new technology in order to cope with the power crisis it happened to be facing at the time (Personal Communication: former NTPC official, now consultant).

The constraints in the spread of this technology are that there is a problem of availability of this resource in India. Also, the calorific values of this fuel being almost four times that of coal, the technology is very expensive.

Renewable energy. Its potential is for rural, remote non-electrified areas but where it can feed into the power grid, it an also contribute to the urban consumer market. The responsibility for developing this potential lies in the institutional arrangements. The approximately 70 per cent non-electrified rural areas should be targeted in an intelligent way. This implies that it is for the urban consumer, it would be an unwelcome investment as in urban areas there is access to cheaper alternatives. In the case of rural areas, the power demand is a function of capacity for investments which is very limited, and capacity for utilisation. As a vast area still exists that has not been electrified, the need has to be created over time. It takes an initial 5 to I 0 years for the programme to take off as the load, the demand, has to develop. Also, for the initial years, non-conventional energy sources will have a supplementary role to conventional energy sources.

As an alternative, this has a lot of scope in India as mentioned in the above section. Especially in the case of remote regions such as the north-east region of the country, that is as yet in a poor developmental state in comparison to the rest of the country. MNES is trying to focus now on the north-east as well due to this regional focus begun by the previous government. It-is focusing, mainly on micro-hydel projects in this region and there is coordination with MOP on this. Also, the option of how ready the state of renewable energy technology is in India at present and whether it can withstand an introduction into the market now has also been explored (refer to section on Public Interest Litigation).

Conservation measures

However, none of the-'options seem all that viable at this point of time. Especially not considering the energy needs of the country that have to be met. It looks as if further expansion of the thermal power sector is inevitable. The stress thus has to be on energy saving and better housekeeping practices.

MOP has tried to carry out energy conservation measures or to carry out research and development initiatives and spread the word about its significance. These initiatives have been in association with research institutes (such as the Central Power Research Institute, Central Fuel and Central Electro-chemical Research Institutes, Indian Institutes of Technology), the Central Electricity Authority and the respective state governments state electricity boards. This is not solely due to environmental considerations but also due to the need to bridge the gap between demand and availability of energy. The balancing act between feeding the continually growing energy demand that is fuelling the growth of the economy, and managing the resultant pollution problems, has led to the need to mop up all forms of energy going unutilised or worse, being wasted.

The supply side management for energy conservation focuses on generation activities and the process of transmission and distribution. Studies for secondary fuel oil consumption reduction and for energy audits have been carried out and the concerned state governments asked to respond to the results of the studies, and implement the necessary changes required. A number of TPPs have been studied since 1994. Energy audits and technology upgradation have tried to reduce transmission and distribution losses. Demand side management has tried to improve energy efficiency in the agricultural sector through coordination with the Rural Energy Corporation.

Confederation of Indian Industry and other industrial associations have contributed to the efforts in the industrial sector (including small and medium scale industries, which are often the more polluting) through technology improvement and training of personnel.

Co-operation from the UNDP, ADB,EC, US and Germany in the fields of technical assistance, policy studies, and the like have also added to the possibilities in this direction.

Integrated approach

In the above measures, an integrated approach to the problems is what is missing. The stack height for TPPs has been gradually increased from a mere 30 metres to over 200 metres, electrostatic precipitators have gone up to almost 99.9 per cent efficiency, but all of these measures merely succeed in shifting the point of pollution. The bottom ash precipitated by the ESPs will lead to the formation of ash ponds, and, if this is not properly looked after, to land pollution. More integrated measures along with initiatives for technology development, are required to comprehensive deal with thermal ower station related pollution.

The pressure chain

The entire system is very regulation driven. The Environment ministry puts pressure on the Power ministry to keep in mind consequences for the environment. The Power ministry in turn puts pressure on the other relevant ministries to be able to go through with the required measure. This is the case whether it is MOPNG in the case of cleaner fuel use of whether it is the Ministry of Coal for the washing of coal and making the requisite technology adaptations.

Indoor air pollution

Indoor air pollution is a problem in the rural areas and in the vast and expanding urban slums in the country. The NPBD (National Biogas Development Programme) and the NPIC (National programme for Improved Cookstoves) are MNES programmes that were launched in the early 1980s with the intention of promoting energy efficiency by providing clean cheap fuels, conserving fuelwood, reducing smoke levels in the cooking space and removing the drudgery of women. Renewable energy is a sector where traditional networks, traditional management systems play a very important role. Panchayats and other local bodies have to be involved. Also, the nature of these programmes is such that they are more or less focused on rural areas. A number of NGOs are involved along with the ministry in implementing these programmes and disseminating the technologies. In fact a certain allocation of the budget for these programmes is made specifically for the non-governmental sector. Thus, this sector of air pollution has very different characteristics from the others.

Potential. India has the one of the largest Biogas Programmes in the world, second only to China (p. 196, ed. V Ramana). Based on the 1961 livestock census, it was estimated that it could generate almost 195 billion kWh of energy, annually equivalent to 24 billion litres of kerosene, and 236 million tonnes of manure [Source: Venkata Ramana P, "Biogas Programme in India: a status

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report"]. Of this target, as yet 22.57 per cent has been accomplished. In the case of improved cookstoves, 23.5 per cent of the estimated potential has been achieved (Source: MNES. 1997/98. Annual Report).

Administrative set-up. In order to incorporate region specific factors & to encourage entrepreneurs & non-governmental organisations to participate, NPBD is implemented as a decentralized multi-model, multi-agency programme. The multi-agency strategy is also seen in NPIC. This set up is described for NPBD as follows–

- The State nodal departments implement the programme, corporate and registered bodies, the Khadi and Village Industries Commission and the National Dairy Development Board. At the state level, the programme is implemented through a nodal agency (Council for Science and Technology, Energy Development Agency, etc.) which is primarily responsible for achieving targets, managing finances, monitoring, etc. At the district and block levels, the District Rural Development Agency (DRDA) and the Block Development Office (BDO) implement the programme. Others involved at the district, block and village level are local entrepreneurs, rural non-governmental organizations (NGOs), gram panchayats, rural co-operatives, etc. NGOs like All India Women's Conference (AIWC), New Delhi; South Asia Partnership (SAP), New Delhi; and Sustainable Development Agency (SDA), Kanjirapally, Kerala are also given targets.

- The Ministry has also created a network of 17 Regional Biogas Development and Training Centers (RBDTCS) across the country. These centers impart training and provide technical support to various groups of people involved in the implementation process. Several incentives are given under NPBD. Provisions are also made for organizing training programmes, awareness campaigns, setting up fertilizer demonstration plots, etc.

Review of the programmes

Applied Economic Research that have tried to assess the functional rate set it as somewhere between 60 and 80 per cent for NPBD and from 55 to 80 per cent for NPIC. This implies extremely varied results. A closer look at the planning and implementation process needs to be taken to understand this unexpectedly low and unevenly distributed functionality.

These programmes have been met with a mixed degree of success and failure. An analysis* reveals that despite the nature of the approach, there has been a lack of involvement of local people, especially women, in technology development, programme planning and implementation.

User-based approach. It is not sufficiently appreciated that technologies do not exist, or are not introduced, in a vacuum; that they can redistribute and rearrange people, power and everyday practices. A user-based approach is essential. Research activities have to be user-oriented and feedback-based. The cooking habits and fuel use requirements of the local population has to feed into the technology, as it will naturally affect its application. Operation and maintenance systems need to be in place and accessible.

Visible benefits. And the benefits have to be such that they are visible to the user. There has to be a significant saving in fuel and reduction of smoke over the use of the traditional stove. This is essential as the target population in such cases are rural families for whom even the highly subsidized stoves represent a considerable investment that thus has to be worth its opportunity cost, i.e., the cost of diverting the limited available funds into the' investment for the stove.

Target-based approach. The approach as regards implementation is such that an all-out attempt to harness the available potential takes place by the government agencies at the lower administrative levels, that makes the approach very target-based. The overall annual target for plant installation becomes the main force dictating the introduction of this technology in more & more rural areas. This results in the interests of the users at the grassroots level either not being given due importance or being compromised.

Market demand. There is also a problem of market demand but for devices like these, it is also a question of creating a market through proper demonstrations, educational and awareness initiatives. MNES has been trying to get a "Women's Component" included in the programmes of the MNES. The focus should be on Women's empowerment. This implies actually involving them in the programmes - in the decision-making process, most importantly, in the training courses, user courses, training of turnkey workers, etc. There should be a reversal of roles such that the users could be conducting courses.
Whatever is said about their participation, there is ultimately very little of it.

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* The analysis has been derived from TERI=s perspective that has evolved after accumulating over a decade =s experience of disseminating renewable energy technologies in the field, as well as TERI;s interaction with policy makers on this issue at a national and international level.

Encouraging integration. MNES is trying to transform its very programme-oriented approach and encourage interaction among the various sections. Thus, there is a move towards giving a fillip to ensure a more integrated approach. The Ministry is, for instance, trying to liaise with the Department of Women and Child Welfare for the implementation of the programmes.

One of the issues for discussion identified in a 1995 MNES Background Paper is institutional linkages referring to links within the Government, i.e. between the relevant ministries and government bodies, government programmes. For example, the programme for ICs should be tied up to that for rural housing. The dissemination of biogas plants should be linked to rural sanitation programmes but they work on separate lines altogether. -Before the creation of newer links - the presence of pre-existing needs to be verified so that there are no overlapping functions. The creation of such links or the strengthening of those already present not only prevents overlapping & the consequent waste of resources and time, but also contributes to a more holistic approach.

NGO involvement. There is also an attempt to give a fillip to NGO intervention and participation. A certain number of targets are kept to be met by these or organisations - for agencies outside the Govt. Apart from the Technical Back-up Units of the government, NGOs like Khadi Village Industries Commission, have their own parallel networks of TBUS, etc. An NCAER stud has found that dissemination by NGOs has been more effective. There are divided views about their impact-as networks of larger NGOs can be as top-down in their approach as the government bodies who set the plans and targets at the ministry level without giving consideration to the diversity of needs at the grassroots. The NGOs that have shown more results should be given more targets from MNES.: KVIC and National Dairy Development Board, for example, have shown a high performance. However, a lot of targets may be given to other organisations that may be more because of long-standing relationships because the importance they are given does not seem to be commensurate with their performance in the field.

Attitude of the administrators. NCAER surveys have shown a higher functionality rate for the plants set up by NGOs than for those by the BDO. The whole idea is because the NGOs, through their own or through other GROs, give the people time & space to consider the decision, etc. The aim should be to sensitize the Block & District officials to have this kind of an attitude. The targets are set from above with no knowledge of how applicable/desirable they are at the micro level. The highly centralized nature of programme design and implementation therefore comes in the way of its effectiveness.

Local institutions. The local institutional framework has to be taken into account. That determines the social pattems. And the channeling of the motivations & local knowledge of the government and/or non-government representatives who work at this level would help feed in the required data about local conditions into the programme. From TERI's experience in the field it has been found to be the case that the local grass roots NGOs often do not like to liaison with the Government and prefer to have the plants installed by TERI because of the above reason i.e., their orientations are of a very different nature.

Local community structures and the church communities play a very important role in the North-east. Bosco outreach is the developmental wing of the St. Anthony's Church in Meghalaya. This organisation has, on its own initiative, has made tremendous inroads in the field of renewable energy. Bathing arrangements in the hostels are through solar ponds. They have also set up energy parks. Extensions of these facilities are also there in two other states of the north-east, viz., Tripura and Assam. They now get funding from the state government. But the impetus was entirely indigenous.

"Networking" with the village and non-governmental institutions helps to achieve the sustainability component of all development interventions. It ensures the voluntary interest of the users in the adoption and maintenance of the device - even in the case of community biogas plants. This makes it easier to slowly start handing over the reins of the project management to the community. This is referred to as the "tumover". The sense of ownership and responsibility is inculcated within the community this way.

Other issues

Clean technologies (CTs)

Most of the clean technology in the country is imported. This is conditioned by two factors, predominantly– i) limited hard currency availability, ii) limited skilled manpower. With these two constraints, the technologies imported have been rather old, even obsolete, and also cheap. Among the reasons for getting old technologies is also the assumption that only then they will be manageable for the technicians in the country. The conversion of the inputs of these technologies to contribution towards productivity is low, and their contribution to gaseous effluents, etc., rather high.

The evolution of legislation and policy and standards in other countries has been under two guiding principles

1. What threshold value of a given level of pollution will create health problems
2. What available technology can moderate the above India has adopted technology from other countries that were a reflection of their health &

technology criteria (Personal communication: MOEF official; MOEF Material for ESCAP, 1998).

Clean technologies – a good investment?

The problem is that they are not, as the most important factor in the adopting of any technology is techno-economics. Is the technology feasible, economically beneficial and user friendly? An illustration is the case of coal washing technology. Washeries for coal have been in use in India, promoted because of the economics of transportation costs, rather than any environmental considerations. It was a question of transporting the coal along with the high ash content that was a problem for efficient running of the plant in any case.

Another factor is that CTs are predominantly pollution-prevention-at-source technologies. It is important to try and see how this situation can be changed for the average investor. There is a attempt to push through, from within MOEF, changes that are pro-industry and that will ease the way for those with already installed technologies to be able to deal with their existing technology in the best possible way (Personal Communication: MOEF official). This could imply the most economically beneficial way of disposing of the old technology or of updating it to the most economically & ecologically efficient form possible. Also, the proposition has to be made attractive to new users with a need to install new technology. They have to be shown that CTs are energy efficient & do not cost more .

It must be kept in mind that is only talking about P2-at-source technologies. He/she would prefer the intervention at the source level; as part of the initial investment.

Role of the regulatory agency

The role of the regulatory agency is to facilitate the adoption of the most efficient technology within the economic means of the entrepreneur (Personal communication: MOEF official, TERI personnel). An effort to give this a policy face was made in the 1992 Policy Statement on Abatement of Pollution. This Statement represents the creation of a better, more enabling environment for the entrepreneur. This has created some confusion, as the government has not before been seen in an enabling role, only in a hindering one.

The role of the Govt. in technology adoption is to make sure that obsolete technologies are not adopted and that none should be directly imported. The feasibility and capacity for adaptation in Indian conditions needs to be seen to. Simple government control is not sufficient to make sure that the appropriate technologies are transferred, the required pollution control equipment is installed. Only Govt. control does little more than breed corruption in the fertile ground of bureaucratic red tape and Govt. inspections. Here there is ample opportunity to circumvent the regulations.

Incentives

All incentives are also based on end-of-pipe measures. Initiatives to bring them round to emphasis on the source are going to be launched by the Govt. in the near future. Also, they should be more pro-industry. What is aclled for is a revamping of the entire subsidy structure such that all the superfluous subsidies can be dispensed with. There should be subsidies for procuring CTs, but a one-time subsidy - all others are irrelevant. It will be possible to see that despite this measure, buying new technology will be a much cheaper proposition. The quality and price of the product will also be reflective of the actual value, and will more favourable to the consumer.

This would also facilitate competition at the international level and dispense with the phenomenon, prevalent as of now in the very regulation driven sector of CTs, of the rule of inspections.

The response to this approach is favourable as far as the industry is concerned but the bureaucracy is still gripped, by its characteristic inertia. The problem is that the unions will not appreciate this kind of a set up. Any change from the norm would meet with their resistance. Thus, once again the issue of attitudinal change comes to the fore. Cannot have policy change without that is not going to be a realistic proposition (Personal Communication: MOEF official).

Public support

The attitudinal change required for the successful pplication of incentives to the problem of air pollution is the ability to stand independently of incentives. The cutting out or phasing out the superfluous subsides is going to be difficult as people rely on them - not necessarily because they are using them for their stated purpose, but because they are taken as additions to the bank of finances and their use is diverted to other activities. There has to be a certain demand for such changes from the public.

"Proven" technologies

It is only expected that the developed countries would try to impose their technologies. They have old and used technologies to get rid of and since India insists on the cheapest option, which is usually not the cost-effective option. It becomes a willing dumping ground and the proposition is a win-win one for them.

The way out available now, is of taking "proven" technologies, i.e. technologies that are not 50 years old, but 15-20 years old.

Also, we need to understand the benchmarks in technology globally, and also what our own benchmarks are. Also, although it is done by pressure, the advantage is that the concept of clean technologies is slowly gaining wide currency in India.

Technology transfer

The process of technology transfer itself needs a considerable degree of processing before it can enable the transfer of technologies for which there is a perceived need in India, and for which there are existing institutional arrangements for meeting the needs of maintenance and upgrading. There have to be infrastructure arrangements for the same (Ajay Mathur, 1998).

One of the prominent lacunae identified is information – whether it is regarding the presence of users or about the available and viable clean technologies. Thus, there is an information gap for the parties at both ends of the spectrum – the transferring and the adopting ends. According to Dr. Mathur, the main rationale behind the strategies to promote the adoption of clean technologies by developing countries has to be one of promoting the market development of clean technologies in a big way, focusing on technological risks and market information flows. As information on clean technologies is restricted to small group, decentralisation of information is called for.

The relevant organisations

There is a Clean Technology Division in CPCB which liaises with the National Productivity Council and NEERI on this. It gets funds from donors predominantly for its research laboratories. CPCB, considering the fact that it provides the technology input for MOEF and other Govt. agencies as well as judicial bodies, it has a lot of potential as an important resource for developing indigenous capacity for clean technologies. Its potential also lies in its use as a database that it is developing for CTs, and planning to disseminate it in the relevant areas. Thus, its database, its level of development of clean technologies has an impact for the status of clean technologies within the country as a whole.

As mentioned above in the section on industry, CPCB as well as external donors have tried to promote the adoption of clean technologies and production processes in the small-scale industry sector.

Other than CPCB and the Clean Technology Division within MOEF, it falls within the mandate of the Intentional Cooperation Division of MOEF to see to the transfer and adoption of clean technologies in the country as technology transfer would fall into the categories of international co-operation and aid, or technical assistance which could refer to the technology or the expertise for operating it, or both.

The agencies through which the funds for the same are routed are the DEA, Planning Commission and MOEF. The nodal agency for all external assistance is the Department of Economic Affairs, Ministry of Finance.

External funding agencies

Funding agencies have more or less fixed agendas regarding what they would like to fund and which programmes they would like to support. It is clear that they fund only for a stated purpose. The multilaterals usually have the broadest agendas, bilaterals have a more limited approach and foundations, etc. only fund very specific objectives.

As regards TOT (Transfer of Technology) it has been to some extent that, on an average, projects with a high component of procurement from outside are expedited easily & quickly. A problem is also that proposals for transfers are easily accepted by the Govt. whereas the finer points are either not thought about or not raised. The finer points refer to the infrastructure required to support these transfers in terms of trained manpower as well as laboratory space & equipment, etc. The relevance of the technology is a moot point (Personal Communications: MOEF; TERI).

There are constraints in the event of transfers. For instance, either due to Indian weather & dust conditions, or due to lack of maintenance or due to the required technical expertise not being at hand, the technologies are often in a state of low or zero functionality. There are also legal constraints such as intellectual property rights, which restrict the access to technologies in developed countries.

The importance of technology transfers is not being disputed. However, there are changes that need to be made such that the feasibility of the technology in Indian conditions and for the state of existing technology now and in the near future at least is addressed and assessed. MOI stresses the need for joint ventures especially in certain technologies like filter bags for TPPs.

Certain recent developments that have taken place in the field of technology development and transfer, many in co-operation with multilateral organisations are as follows –

- ITPI

  The Investment and Technology Promotion Initiative was set up in the office of the UNIDO Country Director for India at New Delhi in June, 1996, in co-operation with the Ministry of Industry. This project aims at promoting industrial co-operation between the companies from India and the developed and developing countries. The ITPI will concentrate its activities primarily on the small and medium scale sectors. Support to these sectors will help upgrade their activities.

- NCPC
  UNIDO in co-operation with the UNEP has established the National Cleaner Production Centre in India to promote cleaner production. The NCPC-India was formally established in India with the National Productivity Council (under the Department of Industrial Development) as the host institution. During the last 11/1 2 years, there have been information dissemination workshops, training programmes in cleaner production methodology, etc. Indian professionals have been sent abroad as well for the same.

- NPC
  The National Productivity Council was established as an autonomous body under Dept. of Industrial Development. I t provides training, consultancy services, research and information in areas of productivity, industrial engineering, pollution prevention and control. For both NCPC and NPC, the main focus is on the small-scale industry sector.

- PCRI
  Five institutes have been set up with UNIDO/UNDP assistance, for research in newer technologies. One of these is Pollution Control Research Institute, Hardwar. This has been set up by Department of Heavy Industry. The development objective of the PCRI project is to evolve industrial pollution control technologies with respect to air, water, noise and solid wastes to avoid unintended deleterious side effects of economic growth. The institute provides services to various industries and TPPs on a regular basis.
  (MOI, 1996-97)

Public Interest Litigation

1995 is considered to be the Year of PIL cases in the field of environment & pollution control, according to the CPCB Annual Report for the same year. CPCB provides technical input to the judiciary and also to the industry for securing compliance with pollution standards. MOEF is the main agency for dealing with public interest litigation. PIL has shown that there is an urgent need to speed up the implementation process of laws and policies in consonance with the Directive Principles of State Policy in the Constitution of India. These enjoin the state to protect and conserve the environment. That the Directive Principles cannot be enforced by law but GOI can take action in case they are NOT being enforced, or to facilitate their enforcement (CPCB Annual Report 1995-96).

There is a new trend of such cases. The judicial bodies are taking up the matter of pollution and compensation for damages caused, by trying to get the necessary information from the government and explaining alternative options as can be seen from the case cited here.

MNES is a respondent on a case that has been going on for two years. The plaintiff, referring to the death of a child by suffocation, has attributed the reason the use of petrol or diesel generators. The appeal is to ban the use of these generators. The case is still with the Delhi High Court which is anxious to find an alternative solution, and one that is viable both technologically and economically and how best to go about remedial actions. It has invited suggestion from the Central and State governments and the petitioners. Kerosene generators are amongst the worst pollutants. There was an attempt to try and ban them. A meeting was called that included people from the Delhi administration, MNES, MOEF, and CPCB. However, the decision on this is still not completed (Personal Communication: MNES official).

In Japan, the health damage caused and the system of compensation have been very well developed over a period of time. Cases dealing with pollution issues are placed in the category of "civil affairs disputes" (Committee on Japan's Experience in the Battle Against Air Pollution, 1995).
The approach is as follows–

- Because air pollution damage is caused by human activity, victims sought damage compensation on the basis of unlawful acts by the polluter according to civil law.

- This was similar to a general civil dispute. When a civil lawsuit seeks damage compensation, the plaintiff must show damages, prove a causal effect between harmful acts & such damages, demonstrate intent & fault of the accused, & show illegal infringement of the victims' legal rights or property.

The process outlined above as it takes place in Japan is, however, somewhat of an ideal case scenario even there as it is very difficult to scientifically demonstrate a causal relation between damages incurred and activity of environmental pollution. This leaves the defendant (corporate side) holding all of the data & the plaintiff holding none.

In India as well TERI and the All India Institute of Medical Science, the premier medical institute of the country, are engaged in establishing such results.

Conclusion

The perception of pollution has undergone transformation, from a positive sign implying development (smoke being emitted from factories – a sign of industrialisation), to a negative sign, and from relative insignificance to being an overriding concern for all new as well as running development initiatives. More pollutants are being monitored, as their effects on the environment become visible. It is important for the motoring bodies to be able to deal with and adjust to the changing nature of pollution.

The institutional framework that supports these concerns has now grown to include all government bodies that could be directly (for example, MOST) or indirectly (for example, MUAE) influencing air quality, as well as stakeholders from the industrial sector, non-governmental organisations, etc. Thus, the framework has expanded and become more interactive, if still not all that participatory, which would be the next step.

Attempts at forming linkages are more common and visible now. Working with the industry to improve air quality, especially in the urban areas, has shown good results. MNES is trying to further its links with the parallel non-government network that operates at the grassroots level, thus forming links outside its own structure. It is also trying to open up its constituent departments to allow a flow of information and experience between them. This makes for a far more integrated approach to policy implementation especially in cases where there is a multiplicity of agencies in operation as in the transport sector.

A number of recent structural reconfigurations have taken place at the organisational level. The example of the ministries of power, coal and non-conventional energy all being in the same ministry till 1992 is one where the infrastructure and working procedure, etc. have probably had to be set up again.

Yet another factor is the frequent change of personnel, usually due to the changes at the levels of the state governments and the political situation being in a constant state of change. This breaks the continuity of the working procedure. From within the government itself, there is reluctant agreement to there being some scope for capacity enhancement of the personnel as well.

The severe limitation of financial resources is a constant hurdle in the efficient and complete enforcement of environmental policy. Now, economic instruments are being integrated into the environmental policies and have begun to have a positive effect on the low level of enforcement of environmental laws in India. The subsidy structure, however, needs a lot of working on. This has not yet been done mainly due to the potentially drastic effect it can have on the political ratings of the incumbent governments with the responsibility of enforcing these measures.

Thus, for such drastic and, initially at least, unpleasant measures to see the light of day, public support and the crystallisation of national consciousness as it occurred in countries like Japan is an essential prerequisite. The attitude that prevails regarding pollution checks and rules centres on how they can be circumvented or how only a few individuals would comply with them anyway so what was the point in taking them seriously. Unless this mindset is transformed and a focus on the *duties* that come along with the rights provided to the people is not developed, enforcement measures cannot achieve the required level of success.

This is despite the fact that India has a well developed legal framework and is not new to the concept of regulations for environmental purposes either. The basic goals of environmental protection are enshrined in the Indian Constitution. Anti-smoke legislation was introduced in India a few years after England, in the nineteenth century, when most other developed countries were far away from such a step. Despite that, their enforcement and formulation are tedious processes. The legislative framework, of course, is not without its gaps and inadequacies. Legislation may be incomplete, for instance there are no provisions in the Motor Vehicles Act pertaining to maintenance of vehicles, which could help reduce the pollution considerably.

External funding agencies have had a significant impact on the national consciousness. The aggressive selling of their clean technologies in India or their insistence on developing some form of sensitivity to the environment in development projects as well, can be seen as an imposition on the one hand, and a positive pressure point on the other.

The rise of public interest litigation, and of the voices of NGOs, the incorporation of the input from research and academic institutions into environmental policy – all these are indicators of the initial steps towards the crystallisation of national consciousness.

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4

Municipal Solid Waste

This chapter discusses various issues and aspects of municipal solid waste in the context of the various stakeholders involved. The first few sections dwell on the macro level players – their functions, responsibilities and initiatives taken by them to improve SWM (solid waste management) in the country and the impact of these initiatives. Then there is an analysis of how the institutional, financial and legislative set up of Indian municipal bodies - the most important and critical stakeholders in SWM has resulted in the present grim SWM situation. Consequently the roles of various other stakeholders has been elaborated upon and certain issues, which have not emerged very clearly in the previous sections, have been discussed.

At the macro level the players involved in solid waste management are the Central ministries, various organisations under them and departments looking after the Urban Development /Environment at the state government level. At the Central level the key Ministries are MUAE (Ministry of Urban Affairs and Employment), MoEF (Ministry of Environment and Forests), MNES (Ministry of Non-Conventional Energy Sources), and MA (Ministry of Agriculture).

The micro level players are the ULBs (Urban Local Bodies), which in addition to SWM also execute the functions of public health, education, roads and lighting, etc. The other important stakeholders are the recipients of SWM service i.e. the people, NGOs (Non Governmental Organisations)/CBOs (Community Based Organisations), waste-pickers and international donor agencies.

The macro-level players

Ministry of Urban Affairs and Employment (MUAE)

SWM falls under the purview of MUAE that operates from New Delhi. The broad area of responsibility of MUAE in terms of SWM and all other issues pertinent to Urban Affairs is in terms of policy formulation and monitoring of programmes in these areas which are essentially state subjects according to the constitution. MUAE plays a co-ordinating and monitoring role, sponsors research and development projects, and organises training courses and workshops and processes assistance from bilateral and multilateral international agencies (MUAE, 1998). It basically acts as a facilitator.

The Ministry, concerned by the problem of waste management in the vicinity of IAF (Indian Air Force) airfields has financed preparation of feasibility reports for SWM in 10 towns in the country that have IAF airfields and is now hoping to implement these schemes with the assistance of the concerned ULBs /Airfield Station authorities. Realising the inadequacy of ULBs in terms of expertise and experience in managing their wastes properly, the Ministry is currently engaged in the process of finalising a manual on the directions of the Supreme Court of India, which would serve as a practical tool for the ULBs to help them and guide them in their efforts of managing the municipal waste. HUDCO (Housing and Urban Development Corporation) and NIUA (National Institute of Urban Affairs) are two autonomous bodies operating under the aegis of MUAE, which have been involved in some way or the other with the activities of SWM.

National Institute of Urban Affairs

NIUA, since its inception in 1975 has undertaken several studies on solid waste management in the broader context of urbanisation, environment and technology, etc. It initiates and assists in developing suitable policies and programmes related to the problems of urban development and allied fields by the Central, State and local governments as well as private and public sector undertakings, acts as a centre for advanced study of urban problems and also provides necessary training and research facilities. The institute is currently working on project FIRE (Financial Institutions Reform and Expansion), in collaboration with Community Consulting International, USA wherein it is studying issues like willingness to pay for urban services, and is also training the municipal officials for better account-keeping practices. These activities broadly aim at improving the administrative machinery and have a definite effect on services like solid waste management and water and sanitation, etc.

Housing and Urban Development Corporation

HUDCO, set up in 1970 as the apex techno-economical organization under the public sector by MUAE provides loans and technical support to states and other eligible organizations for various housing and infra-structural development projects. Aware of the fact that the local bodies lack the funds and the technical expertise for delivering effective waste management services, it set up a Waste Management Cell in 1994 to give loans to the urban local bodies, development authorities, health-care establishments, private companies and NGOs for SWM services and also to provide consultancy services wherever required. Till now an amount of Rs 320.598 million has been provided by HUDCO as loan for 10 different projects for provision of infra-structural facilities like waste storage, collection and transportation equipment, setting up a compost plant, developing a sanitary landfill, installing an incinerator for health-care waste etc (HUDCO, Personal Communication, October 1998). The study on waste management near the IAF air-fields, mentioned before was carried out by HUDCO on the behalf of MUAE.

Ministry of Environment and Forests

After MUAE, the second most important Ministry involved in SWM is the MoEF which is the nodal agency in the administrative structure of Central government for the planning, promotion and co-ordination of environmental and forestry programmes. The Ministry is basically an administrative body, which frames policies and rules and regulations on issues related to environment and forests, and gets these implemented through state bodies or any other agency identified by it. It also promotes environment and forestry programmes, research, education and training to augment the requisite manpower, dissemination of environmental information, international co-operation and creation of environmental awareness amongst all the sectors of society (MoEF, 1998).

The foremost initiative taken by MoEF in the area of solid waste was that of setting up of a NWMC (National Waste Management Council) in 1990, to advise the government on fiscal and regulatory measures required to render advice on all aspects of waste management and recommend R&D (research and development) schemes for developing new technologies for waste disposal. On the recommendation of NWMC and recognising the need for taking remedial measures to cope with the problem of plastic waste, a plastic waste management task force was constituted by MoEF, which submitted its report in August 1997. Following the contents of the report, issues like formulation of strict guidelines for recycling, technology upgradation in the recycling industry and incentives for adoption of appropriate technologies are being discussed currently at various levels in the Ministry. A notification is also being expected from the Ministry in this regard very soon. MoEF often works in close collaboration with the CPCB (Central Pollution Control Board) - an autonomous body under it.

The Ministry feels that SWM falls under the purview of MUAE and MoEF has nothing much to do with it. However, the fact is that today mismanagement of the urban issues is affecting the quality of environment in the urban areas and hence it becomes the duty of the MoEF to ensure that the country has appropriate laws and regulations to govern and keep a check on the rising environmental degradation. It would then also help MUAE to frame its policies with due regard given to the environmental factors. MOEF being the sole central regulatory body which issues notifications, etc., needs to awaken and comprehend the environmental problems which the country would be most likely facing in the coming years and provide adequate regulatory back-up beginning right from now so that these do not acquire catastrophic dimensions later. The Ministry can no longer afford to adopt a "cross the bridge, when it comes" attitude, in view of the serious environmental dangers the country is facing already, having ignored the warning signs in the past years.

Table 4.1 lists the rules/guidelines in force at present in the country that deal with MSW/Biomedical/Hazardous waste. Though this chapter does not deal with hazardous wastes, yet the legislation on the same have been included for the sake of providing information.

Table 4.1 Some legislative milestones in solid waste

Milestone	*Year of issue*	*Issuing authority*
Minimal National requirements for management of municipal solid waste	Final draft being processed. Expected to be issued very soon.	
Biomedical waste (Management and Handling) Rules	1998	MOEF (under EPA Act, 1986)
Hazardous Wastes (Management and Handling) Rules	1989	MOEF(under EPA Act, 1986)
Manufacture, Storage and Import of Hazardous Chemicals, Rules	1989	MOEF (under EPA Act, 1986)
Guidelines for recycling of plastics	1998	BIS* No 14534
Recycled plastics for the manufacturing of products- designation	1998	BIS No 14535
Solid wastes -hospitals- guidelines for management	1989	BIS No 12625
Guidelines for use of vehicles for collection of municipal solid wastes	1989	BIS No 12662 (part 1)
Solid waste management system- collection equipment- guidelines	1989	BIS No 12647
Methods of analysis of solid wastes (excluding industrial solid wastes)	1982	BIS No 10158
Method for physical analysis and determination of moisture in solid wastes (excluding industrial solid wastes)	1979	BIS No 9235
Method for preparation of solid waste sample for chemical and micro-biological analysis	1979	BIS No 9234

There is no separate central law pertaining to solid waste, unlike water and air. It is dealt with in the overall perspective of Environment Protection Act of 1986.

Central Pollution Control Board

CPCB was set up in 1974 under the Water (Prevention and Control of Pollution) Act, 1974 as an autonomous body under the aegis of MoEF. It has an important advisory role to the Central government on all the matters of environment and pollution. It is the law-enforcing body at the Central level and is entrusted with the work of enforcement of environmental legislation in the Union Territories. It coordinates the activities of state pollution control boards and provides them with technical assistance; collects, compiles and publishes (technical and statistical data); disseminates information; and also lays down/ modifies guidelines and standards relating to sewage and trade effluents and stack gas emissions.

The solid waste department of the Board has already finalized National Guidelines for Municipal Solid Waste Management and has circulated the same to the state pollution control agencies, municipal bodies, NGOs, etc. for comments and suggestions. It is hoped that once these guidelines are issued either by MoEF or by CPCB (MoEF will have to empower it for doing so!) under the Environment Protection Act of 1982, the board and the state pollution control boards will be able to push the municipal bodies (the actual deliverers of the service of waste management) for better SWM practices. The board officials are optimistic about the improvements in the future and believe that it is only the lack of willingness and motivation that has crippled the system. Most other considerations are either in place already or are slowly falling in place to make things move.

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* BIS (Bureau of Indian Standards) is a statutory institution under the Bureau of Indian Standards Act, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connecting matters in the

Ministry of Non-Conventional Energy Sources

A full-fledged MNES was created in 1992, replacing the erstwhile Department of Non-Conventional Energy Sources in the Government of India to give impetus to the field of Non-Conventional Energy. Promotion of energy recovery from urban, municipal and industrial wastes has been one of the key components of MNES's programme. The Ministry has been adopting a three-pronged approach in its promotional implementing strategy, viz.,

- Provision of budgetary resources of the Government for research and development, demonstration and rural oriented extension programmes;
- Extension of institutional finance through the Ministry's financing arm, namely, Indian Renewable Energy Development Agency (IREDA) and financial institutions, for commercially viable projects with private sector participation and external bilateral and multilateral funding;
- Promoting private investment through fiscal incentives, tax holidays, depreciation allowance and facilities for wheeling and banking and remunerative price for purchase of grid-quality electricity generated in the project.

MNES is currently implementing two programmes for recovery of energy from wastes by involving government agencies, technology providers, consultants and entrepreneurs. These programmes are i) *National Programme on energy recovery from Urban, Municipal and Industrial wastes*, and ii) UNDP/GEF assisted project entitled, '*Development of High Rate Biomethanation Processes as a means of Reducing Green House Gases Emissions*" (MNES, 1998).

The Ministry monitors the projects and programmes supported and promoted by it through the state nodal agencies on renewable energy. Almost all the states in the country have these agencies which are looking after the " *waste to energy*" subject within the broader perspective of renewable/non-conventional energy sources. When, the programme was started in 1995, the response was lukewarm and MNES officials had to constantly convince and push the ULBs to take advantage of it. However, things have changed in the past three years and now the ULBs as well private investors are approaching the ministry on their own for setting up waste–to-energy plants (Personal Communication, 1998). The number though encouraging is not enough. Since waste-to energy plants are highly capital intensive, ULBs and even private investors find it difficult to put money into these kind of projects. About 70%-80% of the current plants installed in the country have a share of foreign funding in addition to the subsidy provided by the MNES, for this very reason and also most of these plants are on build-own-operate basis. The monetary situation of these ULBs is so critical that now they have begun to demand a price to provide city/town garbage from the private investors approaching them for setting up *waste-to-energy* plants, (Personal Communication, 1998).

Another reason so as to why the ULBs are not willing to spend money for these plants is that solid waste management is still not a priority for them as they are still struggling to cope up with more grave problems of providing drinking water and sanitation facilities in their areas.

The Ministry strongly feels that time is running out and the process needs to be hastened. Hurdles like - agreement of sale and purchase of power between the electricity boards and plant builders are being slowly overcome with more and more states (Maharashtra, Tamil Nadu, Andhra-Pradesh etc.) announcing policy guidelines recommending minimum sale-purchase price of electricity produced by converting energy.

Table 4.2 gives an elementary idea about the profile of people working on the issue of SWM in the Ministries and associated organisations. MUAE and MOEF- the two main bodies involved in the process of SWM are ruled primarily by the bureaucrats and this might be one of the key reasons why these bodies are not doing enough to push things forward in the right direction.

Table 4.2 Profile of SW professionals in various ministries

Organisation	*Professional staff*	*Supporting staff*	*Profile of professional staff*
MUAE	7	7	Engineers, bureaucrats
HUDCO	3-4	1	Environmental scientists, engineers, microbiologists
NIUA	2	2	Economists
MoEF	8	?	Bureaucrats
CPCB	9	3	Engineers, scientists, microbiologists
MNES	6	10	Engineers- chemical/environmental/ agriculture
MA	25-30	?	Post graduates and doctorates in agriculture science, Bureaucrats

Source. Personal Communication, relevant authorities, 1998

Other Ministries

During the VIII five year plan, the Central MA, realising the importance and need of promoting the recovery of bio-fertiliser from urban/municipal solid waste launched a scheme whereby it offered financial assistance for installation of compost plants to the extent of one-third of the project cost subject to a limit of Rs 5 million per plant. During the time period 1993-94 to 1996-97 it released funds to the tune of Rs 39 million for 20 projects all over the country (HUDCO- not dated and Personal communication, Ministry of Agriculture, 1998). 12 of the above sponsored compost plants are operational today and have varying capacity between 100-150 ton per day. A revised scheme in this regard has been floated very recently under the IXth five-year plan, whereby new proposals are being considered.

A RDF (Refuse derived fuel pellets) plant was set up by the DST (Department of Science and Technology) in Mumbai in 1994 in the direction of providing technological solutions to the problem of MSW. The plant had a capacity of 150 ton per day and was set up on the initiative of a few individuals within the Ministry who were concerned about the problem of SWM. Though SWM does not fall into the mandate of DST, the ministry provided about Rs. 40 million for this particular project. Unfortunately, after this one plant, not much headway has been made in promoting this indigenous technology. The Ministry is open to assisting any organisation/private company/ individual for technology transfer, installation and commissioning of a RDF plant but does not have any scheme like that of MNES whereby financial aid is given for the purpose.

Table 4.3 gives a snapshot of the functions and role of the various ministries/organisations discussed in the above few sections.

Ministry/ Organisation	*Conducts projects and studies*	*Monitoring and implementing*	*Training*	*Finance*	*Regulatory*	*Information dissemination*
MUAE	No - entrusts to relevant organisations	Yes- monitoring only	Yes	No - at present but would be soon in near future	No	Yes
MoEF	Varies- depending upon the situation	Yes - through state pollution control agencies	No- only finances	No	Yes	Yes
CPCB	Yes	Yes- does it through state pollution control boards and wherever possible on its own	Yes	No	Yes- MoEF can empower it to do so	Yes
MA	No	Yes-only monitoring - officials go themselves to field to monitor	No- has been deleted in the revised scheme floated recently	Yes	No	No
MNES	Yes	Yes - through state nodal agencies on renewable energy	Yes	Yes	No	Yes

Source. Personal communication, relevant ministries, 1998

It is clear from the table that the Central Ministries formulate policies, issue guidelines and regulations, help in technology development and put forth schemes for providing financial assistance for promotion of better technologies etc. Almost all of them are engaged in information dissemination exercises except MA. However, as it would emerge in the latter sections of this chapter, the message of better SWM practices and better technology for disposal is not getting carried across. There is a need for the Ministries to pool in and co-ordinate their efforts so that the process is a continuous one and is able to reach the smallest ULBs the most remote corners of the country.

Urban local bodies; the micro level players

The ULBs during their initial stages in the pre-independence period were considered as schools for imparting public education and training and as a stepping stone for the prospective members of the state or central legislature. Hence, the emphasis was on education rather than on service and efficiency. After independence, the ULBs were made a state subject, with no constitutional provision for either the responsibilities or revenues of local bodies. There was nothing inherent in the powers of an urban local/municipal body, and the state government had wide controlling and supervisory powers over it.

The constitution and powers of a local body be it rural or urban, falls under the purview of the state government according to the (Schedule 7, Entry 5th) of the Indian Constitution. Further the entry 6th, 13th, 17th and 18th in the same Schedule 7 indicate that public health & sanitation, roads, bridges and municipal tramways, water supply and drainage, and rights in or over land, land improvement and colonisation respectively are also state subjects. Entry 6th in schedule 12 (Article 243-W) inserted by the 74th CAA of 1992 clearly states that solid waste management is the duty of the ULBs.

Institutional set up and bottlenecks

Various forms of ULBs

The urban areas are administered and governed by ULBs of various kinds - municipal corporations, municipal councils, municipal boards, town area committees and notified area committees, cantonment boards, etc. (Table 4.4). The powers and functions, responsibilities, resource raising powers, etc. of any ULB depends upon the legislation laid down by its state and therefore, vary from state to state.

Table 4.4 Various forms and number of urban local bodies: 1968 to 1990

Form of urban local bodies	*No. of local bodies*			
	1968	1971	1987	1990
Municipal Corporations	30	34	73	73
Municipal Councils	1473	1493	1745	1770

Notified Area Committees	115	202	-	717
Town Area Committees	385	385	-	229
Cantonment Boards	59	58	62	62

Source. Census of India 1991.

Decentralisation in the context of 74th CAA

The above 5-tier system of ULBs was changed to 3-tier system by the 74th CAA(Constitution Amendment Act), 1992 (Appendix 1). The notified area committees and town area committees were done away with and nagar panchayats were introduced instead. The municipal councils and municipal corporations were retained. Further any ULB with a population of more than 300,000 was supposed to have a further 2-tier system, with the aim of decentralising the municipal administration for enhanced efficacy and to bring the citizens and the local bodies closer together. Decentralisation is quite important and in taking take the local government i.e. the ULBs, to the doors of people in actual terms.

However due to non-implementation of the above, most of the ULBs continue to work with a centralised approach.

The experience of the city of Surat needs special mention in the current context. While on the path to cleanliness after the plague epidemic in 1994, the city was divided into 6 zones to decentralise responsibilities for all the civic functions. A commissioner was appointed for each zone and he was given the authority to sanction an amount upto Rs 200,000 for work without prior permission of the city's Municipal Commissioner (Personal Communication, 1997). This avoided undue delays and resulted in speedy implementation of decisions taken by the corporation. People were issued grievance redressal cards, which they could fill in case of any complaint, and drop it at their zone's office. The complaint is attended to within 24 hours and card is returned to the citizen. This way, the corporation officials are aware of the performance of their staff in the field and problems are sorted out in a congenial manner.

Most of the time, the officials in a majority of ULBs are oblivious to what is the actual situation in the field and there is no way they can get to know of it as contact mechanisms with the common man are absent. At times, when they are aware they are unable to do anything as they do not have the authority and the money to do so. The 74th CAA was passed with the intention that ULBs work in close co-ordination with people, but in the current context there are many glaring deficiencies in it which leave a lot of scope for the state governments to inhibit this capacity building process of ULBs. The Act gives the state governments the discretion to interpret what town/city would fall under Nagar Panchayat or Municipal council or a Municipal corporation. Nothing has been mentioned in regard to the cantonment boards, which are very essential in the civic administration of civic cantonments- whether they are there to stay or have to be done away with in view of the new 3-tier structure.

The 74th Amendment Act is in fact a diluted version of the 65th Amendment bill, which had clear specifications about issues mentioned as above, as well as many others. This bill was not adopted by the Indian Parliament as it was meant to give a lot of power to the local governments so as to strengthen them and enable them perform satisfactorily. The state governments, however, perceived its provisions to be a blow on their autonomy (Jha 1993) and hence they ensured that it could not be passed in the Parliament. Most of the state governments in the country have an attitude of indifference and laxity towards the local bodies - especially the urban ones. Even the central governments took more interest in the rural local governments in the post-independent era and it was only in the Seventh Five Year Plan document that a note was taken of the mess that most of the urban centers of the country were in in terms of the environment, due to the non-performance of ULBs.

Some other bottlenecks

The institutional changes were the first step when Surat began its journey from the plague incident to the status of second cleanest city of country. The officials responsible for SWM were made accountable for their work and field visits were made mandatory for them each day. The SWM and other related departments were made to work in greater coordination and cooperation. Indeed these are some of the very basic changes that need to be introduced in the functioning of all our ULBs. Most of the SWM officials work in such isolation, and sitting inside their offices, that they are completely unaware of what their subordinates are doing on the field.

Talking about accountability, the municipal elections which are supposed to be held after every five years according to the provisions in the 74th CAA, are meant to be an important accountability tool in the hands of people. If an elected municipal body does not come up to the expectations of people in provision of urban services they can be voted the out in the next. Here there could be two reasons for the non-performance of an ULB. First is its non-willingness to work and second is inability to work, inspite of the willingness being there. The second situation is not an uncommon one to be found in Indian ULBs. There are many ULBs that would like to work for people but their hands are tied by the long bureaucratic procedures and high dependence on the state governments for all decisions, as it would become clearer in the next sections. The city of Surat could do what it did because it got tremendous support from the state political machinery and was given many extra powers (though temporary!) also. The elections could vote a real bad ULB out but the problem of internal accountability remains.

Further, there is complete lack of information compilation mechanisms in most of the ULBs. During a project study in March, TERI professionals visited a number of ULBs in the country to collect information on SWM. They found that most of the ULBs did not have the basic figures of the quantity of waste generated in their city.

They had no idea how much manpower/ infrastructure was needed by them. Now one reason for this is the lack of administrative and technical capacity in the ULBs for being able to conduct such a exercise, while another is ignorance of the importance and need to do it. The data, if available with the ULBs, is mostly outdated, unreliable and scanty.

Maintenance of a proper databank, regular updating of the data, free access to the data by one and all are quite important and need to be taken up seriously by the ULBs to be able to plan for their day-to-day functioning and also make decisions for future investments.

Charismatic Individuals

Before winding up this section on institutional mechanisms, it is quite important to mention the phenomenon of a rising number of cases where certain charismatic individuals in the capacity of municipal commissioners/head have led their cities/towns to stand out as examples of good MSWM practitioners in the country. Mr Rao in Surat was the first such individual who shot to fame by accomplishing the almost impossible task of making Surat the second cleanest city of country almost 18 months after it was swept by the dreaded plague epidemic in 1994. Then came Mr Rajat Bhargava of Rajkot, Mr. P U Asnani of Ahmedabad* and now Mr. Asim Burman of Calcutta - they are all shining examples of good work and are serving as motivating forces for the rest of ULBs in country.

Financial health of the local bodies

The most common reason given by almost any local body for its non-performance today is the lack of adequate finances. Needless to say, appropriate fiscal instruments are an essential tool to enable the ULB's to make huge capital investments, incur recurring costs like salaries, operation and maintenance of urban services and also maintain its assets. However, absence of sufficient fiscal instruments, discrimination in the assessment of taxes, inefficient collection mechanisms, political non-willingness, etc. have all resulted in the weak financial administration of most of the ULBs of country.

The share of municipal authorities in the total public expenditure has declined from about 8% in 1960-61 to about 3.4% in 1986-87 (Mathur M P 1994). As a result, in spite of the increasing demand for services (water-supply, sanitation, slum improvement etc.) due to rising urbanization (increase of more than 143% during 1961-1987) and urban growth, the necessary expansion of services could not take place.

Financial decisions of ULBs - state governments prerogative

The municipal laws in all the states enjoin upon the urban local government to send all their schemes of development to the state government for the latter's approval. Even the municipal corporations are required to obtain state approval of expenditures beyond certain limits. This is Rs 1,00,000 in Kerala, Rs 50,000 in Andhra Pradesh and Rs 20,000 in Himachal Pradesh (Jha 1993). In municipalities, the limit is still lower. The provision for making it obligatory to get the sanction of the state government before implementing a scheme of development aims at ensuring that it meets with a minimum level of technical requirements as well as financial discipline and propriety. But the procedure evolved over years by the states for scrutiny and sanction of a scheme is cumbersome and inhibiting (TERI 1998a).

Financial reporting by Indian ULBs

The current single cash entry reporting system of ULBs, although it is in conformation with the state/city level legislative requirements, fails to provide information regarding the status of their financial performance and financial position. This in turn hampers the process of resource mobilisation, monitoring of service delivery, efficient utilisation of scarce financial resources, the quest for performance based grants and planning and implementation of policies and programmes by the states and central government for the ULBs (FIRE (D) 1998). What the ULBs need is the double entry accrual based accounting system. World Bank provided support to six cities in the state of Gujarat – Ahmedabad, Baroda, Surat, Rajkot, Bhavnagar and Jamnagar to improve their accounting systems in 1990. Most of these cities are still struggling to prepare financial statements after eight years due to reasons like incompetent human resources, non-transparent accounting policies, bureaucratic hassles and the single entry cash basis systems which they have been following for past many decades. Understanding the importance of having a double entry system, the state of Tamil Nadu, has engaged in preparing a revised accounting manual for its local bodies which would later support the introduction of a computerised double entry accrual based accounting system with the help of FIRE project and ICAI (Institute of Chartered Accountants of India). The Tamil Nadu Urban Development Fund has hired a software company for the purpose. NIUA is working in collaboration with an US-based agency CCI (Community Consulting International) on the FIRE project for the past 4 years. Lately, few funding agencies have begun to finance urban infrastructure projects and if good use has to be made of these opportunities reforms and transparency in finance and accounting practices will be an absolute necessity for the ULBs to have.

Inadequate fiscal instruments

On the revenue side, a ULB has its own tax and non-tax revenues on the one hand and revenue from assigned taxes and share in non-local taxes and grants-in-aid from the states on the other. These revenues can be better categorised as those from internal sources and those from external sources (Table 4.5). The internal sources can be further classified as tax sources and non-tax sources. All these taxes are levied as per statutory provisions made in the State Municipal Acts of the Indian states.

Table 4.5 Major sources of income for ULB's in India

Source	*Components*
INTERNAL	
Tax source	Property tax, Octroi, tax on vehicles, animals, trade and callings and professions, theatre/show tax, tax on advertisements, boats etc.
Non-tax source	Rent from municipal assets, income from municipal undertakings, fee and fines, income from municipal investment and user charges, etc.
EXTERNAL	
Shared taxes	Motor vehicle tax, entertainment tax, land revenue, stamps duty etc.
Assigned taxes	Octroi, property tax etc.
Grants-in-aid	From the state govt. for general purpose and specific purpose and in lieu of taxes taken over by state govt.

Source. Municipal Acts of various states.

It is obvious from the table that no specific tax for SW service provision is imposed by the ULBs. Known by names as scavenging tax, conservancy tax, drainage tax and sanitary cess, it may or may not be a part of the property tax depending on the laws and regulations in a particular state. Appendix 2 lists few a Municipal Acts, which authorise their ULB to charge conservancy tax as a part of the property tax.

One aspect of the issue of scavenging tax is that, since the collection of property tax is very unreliable and disorganised the amount recovered is inadequate and hardly able to cover the cost of provision of these services. For e.g., MCD (Municipal Corporation of Delhi) charges a general tax based on the rateable value of property, water tax and scavenging tax in a composite form as the property tax. The scavenging tax is charged at the rate of 5% of rateable value and that too either from the buildings owned by the Union of India or the ones used by charitable organisations. No scavenging tax is charged from the common man. MCD spent on an average Rs. 125 per capita in 1995-96 for providing solid waste management services of the total of Rs. 534 per capita spent by it for providing all services including health, education, water supply, sewerage and transport etc. Thus the service is being provided almost free to more than 10 million residents of the city.

No discrimination is made between payers and non-payers of property tax while providing the service. The existing method of charging is definitely under-priced and needs to be replaced by something innovative so that all who are provided the service, pay for it and pay enough for the recovery of expenditure incurred by the municipality.

The income-expenditure disparity

MSWM is a costly service and shares approximately 0.4% of gross domestic product (GDP). This might be low in comparison to the global average costs, but when assessed in relation to India's per capita income, it is extremely high (Mathur M P 1994).

With an overall per capita expenditure of roughly Rs 29 out of a total revenue of Rs 143, SWM is the single largest head of expenditure for a ULB. In terms of proportion it shares roughly 20% of total spending on all services (Mathur M P 1994). Table 4.6 brings out the disparity between income and expenditure under the SWM head for select ULBs, which is true for most of the ULBs of India. ULBs of Tamil-Nadu seem to have some income for this particular activity but ULBs of Madhya Pradesh almost have none.

Table 4.6 Disparity between the income and expenditure on SWM

ULB	*State*	*Size class*	*Per capita income* (Rs)	*Per capita expenditure* (Rs)
Tiruchirapalli	Tamil Nadu	I	8.46	28.50
Villupuram	Tamil Nadu	II	5.26	16.87
Devakottai	Tamil Nadu	III	2.48	22.15
Bhopal	Madhya Pradesh	I	0.86	17.77
Sehore	Madhya Pradesh	II	0.22	14.52
Hoshangabad	Madhya Pradesh	III	1.89	20.76
Vadodra	Gujarat	I	11.63	24.32
Dhoraji	Gujarat	II	1.43	31.04
Kadi	Gujarat	III	0.05	21.04

Note. Class I city has population equal to and above 100,000; Class II city has population between 50,000 and 99,999; Class III has population between 25,000 and 49,999.

Source. NIUA, 1991a and 1992b.

Economic instruments being used in other countries and their possible application in Indian set-up

A wide range of economic instruments are being used worldwide to recover costs incurred in the SW service delivery and to prevent pollution due to non/mis management of the same. Charging systems like impact fees and collection charges, financial instruments like waste delivery incentives, bonds and deposit refund systems, liability insurance and fiscal instruments like property tax (Panayotou 1997a) are the most common of these. Chile, Japan, Korea, Republic of Netherlands, Norway, Philippines and USA employ the bonds and deposit refund systems, Denmark, Netherlands, USA (few states) and most of the OECD countries levy charges and Nordic countries use fiscal instruments (ibid).

User charges are applied for waste collection and treatment almost in every developed country, but only a few offer incentives for waste minimisation and recycling activities (Panayotou 1994b). The households are charged a flat rate while the charges for companies are volume based. Deposit-refund systems on beverage containers combined with product charges on non-reusable containers have been operating successfully in Finland, Norway and Sweden. The percentage of containers returned is 90% for beer and soft drinks and 70%-80% for wine and liquor. The level of deposit also influences the response of consumers to the deposit-refund system. For example, in 1983 Sweden introduced a deposit of ECU 0.04 on aluminium beverage cans, which resulted in the return of 60%-70% of the cans. In 1987 when the government doubled the deposit, 80% of the cans were returned (ibid). Encouraged by the success of deposit-refund systems several European countries are introducing these for polluting chemicals like cadmium, mercury and products like batteries, car-hulks etc. The experience of developed countries indicates that deposit-refund systems are cost-effective instruments for reducing littering, waste disposal costs and for conserving material inputs (ibid). In India, the deposit–refund system for soft drink glass bottles has been there for several years. However there is nothing legal about the system and it has evolved on its own over the years. The manufacturers of soft drinks too have nothing to do with this and they sell their product i.e. contents and glass bottle, to the distributors. Now these distributors pay the entire cost for the first time to the manufacturer. Since the distributors, retailers and the shopkeepers accept the empty bottles back from the customers and in turn pay back them the price of glass bottle, the second time they just return the empty bottles to the manufacturer and pay for the actual liquid content only. In the process no one is at loss but it does save the time and cost of manufacturing more bottles every time and these keep in circulation until broken/lost or used for some other purpose. This mechanism has a high administrative efficiency as no extra monitoring or collection costs are required, since the sellers of the soft drinks operate these themselves. Incentive-based instruments as these could work quite effectively in a country like India instead of command and control ones like fines, prosecution etc. Though the command and control instruments have worked for example in Surat and Chandigarh, but these are probably exceptions as the enforcement mechanisms here were strong. But generally, the enforcement mechanisms are weak and even the court directions are not complied with.

Legislative mechanisms

On the legislative side, the ULBs are governed by the provisions made under the respective State Municipal Acts (Appendix 3).

The Municipal Acts and Municipal Corporation Acts of Indian states divide the duties and functions of the ULBs in their jurisdiction, into two categories- *obligatory and* *discretionary*. Solid waste management falls into the category of *obligatory* duty, for many states (Appendix 4) making it mandatory upon the ULBs to collect and dispose off the refuse generated in their areas.

Going into further detail, the following few sections give a glimpse of what the various Acts have to say in the context of waste management.

The Gujarat Municipalities Act, 1963

This act defines a nuisance so to include any act, omission, place or thing which causes or is likely to cause injury, danger, annoyance or offence to the sense of sight, smelling or hearing or which is or may be dangerous to life or injurious to health or property. Sections 192 to 206 deal specifically with the powers of municipalities for the prevention of nuisance, which includes domestic waste as well. Under this act

- The depositing of rubbish, filth, etc. at any place other than where it is permitted to be deposited under the act is prohibited (Section 192).
- The keeping of any dirt, filth or night soil or any noxious or offensive matter in any land or building by the owner or occupier except in some proper receptacle, for more than the prescribed time, is prohibited (Section 194).

  This and provisions under other sections, are aimed at prohibiting the indiscriminate disposal of domestic wastes.

Delhi Municipal Corporation Act, 1957

Sections 350 to 358, 397 and 398 deal specifically with solid wastes. Section 397 states that no person shall

- Deposit or cause or permit to be deposited, earth or materials of any description or any rubbish and obnoxious matter in nay place not intended for the purpose in any public street or public place or waste or unoccupied land under the management of Corporation; or

- Be engaged in the removal of rubbish, filth or other polluted and obnoxious matter wilfully or negligently permit any portion thereof to spill or fall, or neglect to sweep away or otherwise to effectively remove any portion thereof which may spill or fall in such street or place.

Section 357 prohibits an occupier/owner of premises against accumulation of rubbish for more than 24 hours or otherwise than in a receptacle approved by the commissioner.

Section 353, makes it a duty on the part of the owners/occupiers of a premise to have the premises swept and cleaned; to provide receptacles of the type and manner described by the commissioner for the collection therein of all filth, rubbish and other polluted and obnoxious matter from such premises and to keep the receptacles in good condition and repair; to cause all filth, rubbish and other polluted and obnoxious matter to be collected from their respective premises and to be deposited at such times as the commissioner, by the public notices prescribes, in public receptacles, depots or places provided or appointed under the section 352 for the temporary deposit or final deposit thereof.

In case of failure to do so, the corporation can impose a fine of Rs. 50 on the owner/ occupier, under the provisions of section 461 of the corporation act.

Calcutta Municipal Corporation Act, 1980

Section 336 of the Act prohibits the deposition of solid wastes. It states that no person shall cause or permit to be deposited or throw upon or along any public street, public place, land belonging to the corporation or any unoccupied land or on the bank of a water-course any solid waste except in accordance with the provisions of this Act. Section 338 states that, whoever deposits or throws or causes to be deposited or thrown any solid waste on any place in contravention of the provisions of this act shall, subject to such regulations as may be made in this behalf, be punishable with fines which shall not be less than 50 Rs and more than 5000 Rs, for each such offence.

Similarly section 123 of the *Madhya Pradesh Municipalities Act of 1961,* imposes an obligation on the municipal councils to make provisions for cleansing public streets, places and services, removing noxious vegetation and abating all public nuisance, and for disposing of night soil and rubbish and preparation of compost manure from night soil and rubbish.

Under the section 98 of *Rajasthan Municipalities Act, 1959* it is the primary responsibility of the municipality to remove filth, rubbish night soil, odour or any other noxious or offensive matter.

Analogous provisions can be seen in almost all the municipal enactments, though all of them may not have the penalty clause akin to that of Calcutta and Delhi Municipal Corporation Acts.

Weaknesses of the system

Many ULBs commonly complain of a lack of cooperation from the general public in keeping a city/town clean. It is true to a large extent that the mind-set of the common man in India is such that he/she does not bother about throwing refuse in the refuse bins. Littering the surroundings does not seem to bother the public conscience or offend the civic sense. The general view taken is that it is the sole responsibility of the ULB to clean refuse and maintain the cleanliness of a city. What is encouraging is that this attitude is undergoing a positive change especially in the urban centres of the country and people are growing more concerned about the cleanliness around them, but they might not be willing to make the extra effort themselves. In this case they cannot be entirely blamed for this attitude, as often there are no bins in residential/ commercial areas where people can dispose of their refuse. Thus they are forced to dump it on roadsides and streets. If bins are there, they are placed at very inconvenient places and are overflowing with garbage, deterring any well meaning individual from dumping his refuse anywhere but into the bin. Thus the first step towards better management of city's refuse could be provision of adequate infrastructural facilities in terms of refuse bins. If, once these are in place, the public still does not co-operate, then the ULBs can invoke the penalising provisions to bring the culprits to book. The issue of charging fines again has some controversies surrounding it. Foremost is that, not all the Municipal Acts have a clause pertaining to charging fine from the polluters. To get a clause incorporated the ULB shall have to approach the state government under whose jurisdiction it lies and then a bill in that respect would have to be introduced, discussed, debated and passed by the state legislative assembly. This is a time consuming process and, many state governments might not be willing to do this as it might harm its vote-bank for the next elections.

Another aspect to this issue is the amount to be charged for the littering. Many Acts have specified an amount as little as Rs. 5 for the littering offence. Since these Acts were framed 3-4 decades back, Rs. 5 was sufficient then to deter a person from littering but now actually it is looked upon very cynically by the people. The ULBs, which are invested with powers to charge beginning from Rs 50, also have often described this as to be too low an amount to dissuade people from littering. It is true that the amount is very little, but then there are cases like that of Surat and Chandigarh (Box4.1) which have implemented these meagre provisions and are doing very well in terms of keeping their cities clean.

Box 4.1 The success story of Surat and Chandigarh

The city of Surat made a complete reversal from the plague-ridden mark to that of the cleanest city of the country in a short time of eighteen months in 1996. In addition to the administrative changes, which took place there during this time period, the changed laws had an important role to play in improving the sanitary conditions. Initially, the Gujarat Municipal Act did not have the provision of penalty imposition for littering. However, when the Municipal Commissioner of Surat insisted after the plague that it was important to have some such kind of provision to make the people aware of their responsibility in maintaining the city's cleanliness, then it was decided in a special meeting that the corporation would be given the powers to charge this fine as administrative charges temporarily. Thereafter, the residents were charged a fine of Rs 50 for every offence of littering and the fine was doubled for every subsequent offence. SMC believes that this has been an important factor in containing the common man from littering.

The Chandigarh Municipal Corporation is one of the first few corporations of the country, which empowered its health supervisors, chief sanitary inspector and sanitary inspectors to file the *challan* under section 279, 280, 282 and 323, 324, 325 and 328. The Corporation recovered an amount Rs 76, 000 in 1996 in the form of challans for littering, from the public. Chandigarh has been rated time and again as the cleanest city of the country (Personal communication, 1997).

Both Surat and Chandigarh charge fines on the spot and in case of refusal by the guilty the case is referred to a court of law. Since many people do not wish to get entangled with the court, they pay the fine readily and do not mind paying it as it is too low to matter to them. But then there are people, who when referred to court, use bribery to get the date of hearing of their case extended to a year or more in the court and hence manage to escape from the clutches of law. Rampant corruption everywhere hence hampers the operations of the ULBs.

Poor enforcement mechanisms

There are also Municipal Corporations like Delhi which are authorised by the provisions of the Municipal Act 1957 to impose fines, but are not doing enough to enforce this. On discussion with the officials of MCD, the officials gave the standard reason that Rs. 50 – the amount that can be charged - is too little and does not influence people in changing their behaviour, which actually cannot be accepted in the light of the examples of Surat and Chandigarh. In the case of Delhi, the Supreme Court of India directed the Delhi State government to create the posts of Municipal Magistrates in 1996 so as to deal with the people found guilty of littering. As a result, 16 Municipal Magistrates became functional with effect from December 1996 in MCD and NDMC areas. The High Court of Delhi conferred powers of Metropolitan Magistrate in accordance with the provisions of section 18 (2) w.e.f. December 1, 1997 on 13 Municipal Magistrates. Chit *challans* are being submitted before the Municipal Courts under section 357 (dealing with waste) before the Municipal Courts, maximum penalty under this section being Rs 50 only. As per official sources, 1962 challans were submitted in the months of December' 97 and January' 98 resulting in a recovery of fine of Rs. 3,33,465 by the municipal courts. Since these courts have been established at the zonal offices of various MCD zones, they are very approachable and convenient for quick disposable of the challans.

Brief introduction to SWM technologies

An incinerator cum power generator plant of 300 tonnes/day garbage input capacity was set up by the Department of Non-Conventional Energy Sources, Government of India in collaboration with a Danish firm in 1985 at Timarpur in Delhi. The plant did not perform well from the very beginning because of the incorrect estimates of calorific value of the municipal solid wastes made during the planning phase of the plant and hence was wound up within six months of its operation. In general Incineration, though it is a proven technology and is quite popular in the European countries, is not the ideal technology for disposal of Indian waste.

Aerobic composting has been rather doing well with its plants performing very well in Mumbai and Vijaywada cities. New plants are coming up at Bangalore, Calcutta, Thane, Chandigarh, Gwalior, Solan and one in Delhi very soon (Personal Communication, 1998). The technology has been developed indigenously and the compost produced has been found to have very good soil-enriching properties. A small snag in the future promotion of this technology is the sale of compost generated in the end. Since several tons of compost is generated every day, it is essential to find markets, which can use the compost on a continuous basis. This should however not be a major problem as India is an agricultural country and requires several lakh tons of fertilisers everyday.

AD (Anaerobic Digestion) has an edge over aerobic composting in the terms of end products obtained. The biogas produced during the process can be very usefully used for thermal purpose or if the amounts are large it can be converted into electricity. Energy is in shortage at the moment in the country and in the coming years with its growing demand the prices are going to shoot up further. Then electricity from biogas produced during AD could serve as a very good substitute. The country does not have any major AD plants using MSW as the feed, though a few pilot scale plants of less than 1 ton capacity have been set up. It is difficult to comment at all about the success of this technology in the county unless more plants of larger capacities are set up. Though expensive as compared to sanitary landfilling and aerobic composting, it holds good promise as a future disposal option. It however needs more research and experimentation before being adopted on a large scale.

Technology for RDF was developed within the country as long back as 1994. A 150-ton per day plant was set up by the Department of Science and Technology in Mumbai to produce 80 tons of pellets everyday (DST, Personal Communication, 1998). The pellets have a calorific value of 3500-4000 Kcal/ kg and are being used as substitutes of coal in industry boilers (Chaturvedi and Aggarwal 1996). Additionally, the RDF has fewer harmful emissions associated with its burning. No other plant has been installed anywhere in the country as yet because of several reasons common to all the technologies available. Finance is the foremost of these. Most of the ULBs do not even have enough resources for proper collection and transportation of waste and hence cannot think about adopting a waste disposal technology, as it requires major capital expenditure. It is here that industry is expected to play a big role in the coming years in country. Further, many of the ULBs are still battling to provide drinking water and sanitation facilities and hence are unable to give due attention to SWM. Also, they are unaware of the fact that unscientific disposal of waste can cause environmental damage or that technologies exist that can prevent this.

Technology also has an important role to play in the recycling industry. The recycling industry in India is basically part of the informal sector and most of the recycling activities are carried out discreetly in shanty backyards on the outskirts of a city/town. There is much that leaves to be desired in the recycling sector as far as technology is concerned. A study done in TERI this year in the plastic recycling industry revealed that most of the units run on indigenously made machines and know-how. Very few had semi-automatic machines and everything from feeding the raw material to pulling out the final product had to be done manually. Most of these units are set up with the sole motive of making money and the unit owners are not very much concerned about using better technologies. In plastic recycling a locally made extruder costs below Rs 35,000 while a standard company make extruder's price ranges between Rs 100,000 to 150,000 (Nagpal 1998). To some extent, the Indian govt. too has not shown much interest in the recycling sector and hence it has not been feasible to either develop or import recycling technology from abroad.

Other stake-holders

Increasing activism by the judiciary

The concept of PIL (Public Interest Litigation) is being fostered by judicial activism in the country and has become extremely important today in setting up valuable and important records, especially in the area of constitutional and legal treatment for the un-represented and the under-represented. In the PIL cases, the court is not bound to follow the technical rules of procedure which have been made to sub-serve the need of adversary litigation (Mathur J K, 1990). Proceedings are started on a letter also if it shows sufficient ground for proceeding. Numerous proceedings in the Supreme Court and High courts have been so initiated for not only solid waste but also other issues like water and sanitation, effluents etc.

The first PIL case in SWM was filed in the Supreme Court of India - the highest court of the country, in 1994 (Box 4.2).

Box 4.2 First PIL for SWM in India

Dr B L Wadhera, a citizen of Delhi filed the first ever PIL in country for SWM in the Supreme Court in 1994. The respondents for the case were the MCD and NDMC that look after SWM in about 1440 sq. km. of the total area of 1483 sq. km. of the entire city. After two years of deliberations, in 1996, the Court gave its final verdict on the issue whereby it directed MCD and NDMC to ensure that garbage was collected, lifted and transported from all points in the city. The verdict had 14 salient points. A few of these were - installation of incinerators in all the health-care establishments in the city, submission of bimonthly reports by CPCB and DPCC (Delhi Pollution Control Committee) in the court after field inspection to ascertain that collection, transportation and disposal of garbage is being carried out satisfactorily. This would also help ascertain the adoption of scientific disposal methods like composting and education and awareness programmes via television, etc. Subsequently CPCB and DPCC have been surveying and submitting reports in the court and their investigations have indicated that there has not been much change in the cleanliness situation in-spite of the directions of the court (Personal Communication, Dr Wadhera, 1998). The case is now transferred and is being followed up by the High Court of Delhi.

One good thing that has happened because of the rising incidence of PIL cases has been the issue of the Biomedical Waste (Management and Handling)Rules this year. The draft rules had been there in 1994 also but since they had not been notified, their existence on paper did not serve any purpose. Since most of the medical establishments do not have an incinerators to dispose of their waste they were dumping it in the community bins, which created a high risk for the waste pickers as well as people living in the immediate vicinity of the bin. Mixing of medical waste with the municipal waste turned the all of it infectious and hence was leading to hazards at the disposal sites also. To avoid the mixing of municipal and bio-medical waste and to ensure proper disposal of bio-medical waste, the SC (Supreme Court) ordered the draft rules to be notified under the EPA Act 1986. Since the rules were inadequate and had many technical loopholes, objections were raised by NGOs active in this field and subsequently after series of discussions with CPCB, NGOs, health establishments, etc. new rules were drafted and finalised and issued this year in July. The NGOs played a very important part in the finalisation of these rules and ensuring that these were passed after taking into the considerations and views of all the stakeholders involved.

Ms. Almitra Patel of Bangalore filed another PIL, in the SC of India in 1996. The case was against the Union of India and selected class 1 cities of the country. It charged all them of with negligence in doing their duty of proper waste management and drew specific attention towards mis-management of the landfill sites. Subsequently the respondents in the court filed affidavits. During the course of the court proceedings, Mrs Patel suggested formation of a committee under the MUAE to frame a plan of action for the class 1 cities. The committee was constituted by MUAE under the leadership of the present dynamic Commissioner of Calcutta city. It submitted its interim report on the action plan to the SC in June 1998. After going through the contents of the report, SC directed MUAE to circulate the report to all the commissioners of class 1 cities and organise 4 workshops in different regions of the country to deliberate upon the issues in SWM and the action plan and finalise the report. The first workshop has already been held for the eastern region of the country in October and the rest are slated to be held by the end of the current year after which the action plan shall be finalised and submitted to the SC.

On one hand it is good to feel and know that the judiciary of the country is taking interest in matters of SWM but then it is also disturbing that the situation has aggravated to such an extent that courts have to be pulled in to force the ULBs to improve their systems. Still more disheartening is the fact that inspite of the directions of the highest court of the country the ULBs are not ready to enforce the changes. It has been two years since the SC directed the MCD and NDMC (New Delhi Municipal Corporation) to take necessary actions to keep the city clean, but nothing has been done by either of them. This clearly reflects the indifferent attitude of the MCD and NDMC and the ULBs in general. However many directions the courts might give, the situation is not going to improve unless the ULBs themselves decide to do something about it. No PIL cases would be needed once this happens. The willingness to change needs to be nurtured and the attitude needs to be geared in the right directions so as to allow the system to adapt itself to the new requirements and to manage them.

NGOs and CBOs -Instruments of change

The First Five Year Plan (1951-1956) of the country, having realized the importance of NGOs, committed itself to actively support them, facilitating their participation in nation building (HSMI 1996). The successive five-year plans have also emphasized the significant role of NGOs in planning and implementation of development programs (ibid). The NGOs on their part have not disappointed the faith reposed in them and have been doing pioneering work in almost all the development programmes in the country. In solid waste management today there are several NGOs working in the urban areas. Many of them are provided with financial assistance from the various departments and ministries of Central Government and international funding agencies.

NGOs like *Clean Ahmedabad Abhiyan* in Ahmedabad, *Waste-wise* in Bangalore, *Exnora* in Chennai (Box 4.3), *Bombay Environmental Action Group* in Bombay, *Vatavaran* and *Srishti* in Delhi and many others are doing a good job today in creating awareness amongst the citizens about their rights and responsibilities towards SWM, initiating community-based waste management programmes, sharing information and expertise on solutions for SWM problems like implementation of certain programmes and funding opportunities, and promote environmental education in schools etc.

Box 4.3 The Civic Exnoras of Chennai

Exnora, an environmental NGO working in Chennai has been working towards promoting community participation in environmental management especially Solid Waste Management, since 1989. In select localities of the city solid waste is primarily collected by CBOs called Civic Exnoras (CEs), and the system is linked to the Municipal Corporation, which is involved in the secondary collection. For this service the community pays a small amount every month, which goes towards the activities of the CE. A further expansion of this system is being carried out in the city of Cochin, where Exnora is currently working with the Municipality and the private sector. Presently, Exnora is concentrating its efforts on the concept of source separation and recycling of wastes, towards achieving "Zero Waste Management".

Traditionally, Civic Exnoras were considered merely as a service organisation. But today, they are being accepted as a semi- official system by the Municipal body.

These NGOs adopt small residential areas in the cities for collection of waste and have been educating people about the need to segregate waste and manage waste hygienically. A few ULBs, realising the potential of these NGOs, are working in collaboration with them. The *AMC (Ahmedabad Municipal Corporation)* for example works with *CAA(Clean Ahmedabad Abhiyan)*. CAA has been instrumental in organising awareness campaigns and door-to-door meetings, to educate people about the need and importance of segregating waste into biodegradable and recyclable categories. Once they have convinced the people of this and a household begins segregating the waste, the segregated recyclable portion is taken by waste pickers which have been trained by another organisation - *SEWA (Self Employed Women's Association)* and the biodegradable portion is collected and disposed off by the AMC. AMC benefits in multiple ways. It has to carry lesser garbage, waste-pickers do not mess up community bins while scavenging, and the recycling activity is getting promoted without any additional costs for it. Now, the waste-pickers on the other hand do not have to scavenge in the dirty piles for long hours. As they get segregated waste, they are slowly getting accepted by the people as a part of the society and are not shooed away by them, and most importantly they have better earnings and hence a better life. SEWA is actually a paper-pickers co-operative and over the years has helped the waste-picking women to collect paper from various offices and paper-mills. In the past few years it has got involved in setting up different kind of co-operatives offering alternate income generating opportunities to poor women (Venkateswaran 1994).

Similarly in the city of Bangalore, project *Waste Wise* was initiated in 1990 with the aim of improving the conditions of waste-pickers and simultaneous benefits to the local authorities.

CBOs like the *Thoreau Foundation* in Bangalore, *Clean Bombay Foundation* in Bombay, *Save Pune Committee* in Pune and many more in different parts of the country, have been involved in the activities of waste collection, segregation and disposal (vermicomposting etc), training of waste-pickers etc. These CBOs often network with the NGOs and draw upon their past experiences. The financial source for the CBOs is the fee they charge from the residents of the locality they are working in. Most of them hence lack sufficient resources to expand their programmes or upgrade them.

An NGO - Srishti - based in Delhi played a very active role in the drafting and finalisation of Biomedical Waste (Management and Handling) Rules, 1998. It was very prompt in intervening in the Supreme Court of India in the case of B L Wadhera VS Union of India for the inclusion of other suitable technologies besides incineration for disposal and regarding standards for the incinerators. Henceforth it worked quite actively with CPCB and MOEF in the finalisation of the rules. Now that the rules have been issued, it is propagating the cause of better bio-medical waste practices by organising seminars, workshops, training programmes and interaction with the stakeholders involved.

Thus, there is no doubt that the Indian NGOs and CBOs are doing a great deal on various fronts for SWM, but it is important to remember that these cannot replace the ULBs in the provision of this service. NGOs/CBOs are there to act as an interface between the people and the ULBs and provide impetus to the cause of improved waste management by educating people and making them aware of their responsibility in helping the ULBs to keep the city clean.

The government and funding agencies have a vital role to play in terms of provision of monetary and human resources to these NGOs and CBOs so that the awareness programmes spread to the entire city/town population rather than a small pocket, and that these programmes are on a continuous basis so as to sustain the interest and involvement of public.

The informal sector of waste pickers

Due to the increasing content of recyclable matter in the Indian MSW, over the past couple of years a spurt in the waste-picking activities carried out by children, men and women placed at the bottom most rung of the society has also been witnessed. Waste-pickers are a common sight in cities and even small towns of the country. Studies done on the waste-pickers have found that individuals get engaged once in the activity of waste-picking often continue with this throughout their life and find it difficult to shift to some other profession as waste-picking is considered the most menial of tasks and people who get into it generally do so when they are left with no other option for survival. In metros like Delhi the number is as large as 100,000 or probably even more. These waste-pickers contribute a great deal to waste management by scavenging the recyclable matter and thereby saving the municipality the cost and time for lifting and transporting the same, the land for disposal, save virgin resources of country by recovering the same for recycling etc (Box 4.4).

Box 4.4

Assuming that on an average, each waste picker collects about 10 kg waste each day and that there are 80,000 waste pickers in Delhi, the total quantum of waste collected by the pickers daily, is 800 tonnes. This is approximately 18 percent of the total waste generated every day. Further, MCD spent 1247.1 million rupees in 1995-96 to manage 1. 98 million tonnes of garbage generated in the entire year. Considering this, the waste pickers saved the municipal authorities about Rs 182.6 million for the 0.292 million tonnes of waste collected by them which is 14 % of the SW budget.

Thus it is evident that the waste-pickers are doing a great service to the community and the ULBs. The unfortunate part is that the MCD or any other ULB rarely appreciates the extent of economic, social and environmental advantages - or the kinds of public provision and support which retain the economic and resource advantages while improving incomes for the poorer groups engaged in it (Hardoy, Miltin and Satterthwaite, 1992). Most of the urban authorities regard waste-picking activity as illegal and unhygienic and many of them actively seek to suppress and control such activities. Very few of them have recognised that informal processes can be a part of their waste management and waste minimisation policy (ibid).

It has been only due to the efforts of NGOs like Vatavaran in Delhi, CEE (Centre for Environment Education) in Bangalore and SNDT Women's University in Pune and several others, that the plight of waste-pickers has been highlighted and initiatives have been taken to improve the same. These efforts, although at a local level, are quite valuable.

Box 4.5 Improving the lot of waste pickers: an example from abroad

The Zabbaleen Environmental and Development Programme in the city of Cairo in Egypt has been doing something of this sort only. Zabbaleen is a community that has carried out waste collection activities in Cairo for generations. They constitute the traditional private sector, which has been actually responsible for waste management in the city, though the municipal sanitation force is supposed to do so. The Zabbaleen transport the waste to their own settlements outside the city, where they first sort and then recycle it. The sanitary conditions in which they lived were, till a few years back, deplorable and a major threat to themselves and the city. Realising the effectiveness of the community in service provision and to promote it, the Zabbaleen Environmental and Development Programme was initiated around the mid-eighties by the Govt. of Egypt in cooperation with the International Development Association of the World Bank and the Environment Quality International (Venkateswaran 1994). The programme aimed at improving environmental and living conditions of the Zabbaleen, promoting enterprise among the community residents especially the women and increasing the service capacity of the Zabbaleen and instituting low cost technological innovations. Several community based recycling industries were established and a composting plant at the main settlement was put to manufacture compost etc. The programme has provided the community with security, dignity and confidence in being able to help themselves and sustain economic and social gains. Household income has increased dramatically and child labour has been reduced considerably (Venkateswaran 1994).

In Bogota, Columbia, the waste-pickers over the years organised themselves into co-operatives and then with the technical and financial support of Columbian NGOs, joined forces to form a National Recyclers' Association. Organising themselves has brought dignity and recognition to their work and has provided them with an income above the current minimum wage (Venkateswaran 1994). In India too, more NGOs need to come forward and organise and train the waste-pickers, as a few of them are already doing, bringing dignity and respect to their profession in the process.

The government on its part needs to formulate policies to protect and encourage the horizontal growth of these micro resource-recovery enterprises. It also needs to recognise and if possible integrate them with the formal municipal waste management systems (Table 4.7).

Table 4.7 Suggested resp onses of different stakeholder's to various concerns of waste-picking community

Stakeholder	*Suggested response of the stakeholder*
ULBs	Recognise and integrate waste-pickers into their formal SWM system, the way AMC has done.
	Protect them from police harassment by issuing identity cards.
Government	Create a legal framework to protect them.
	Provide with alternative means of living by giving vocational training.
NGOs	Organise and impart training.
People	Segregate waste into biodegradable and recyclable categories

People's View

In any service delivery it is quite important to take into consideration the expectations and views of the recipients of the same. For SWM, the recipients are the common public. People are one of the major stakeholders in SWM as their attitude influences the success or failure of this service delivery. The case of Surat is a blatant example of this fact. The Surat municipal authorities today openly acknowledge that the people of Surat supported them whole-heartedly in the cleanliness drive launched by them after the plague epidemic of 1994. If the people are made aware of the need and importance of things they are expected to do, they respond positively when approached to do the same. Surat might be an exceptional case in the sense that the fear of plague and the newly appointed commissioner of Surat who was determined to make the city clean were very strong driving forces towards improvement.

Most of the people take SWM as a free social service that has to be provided by the ULBs. None of them is aware of the costs involved in the provision of service and how improper waste management leads to severe environmental damage. SWM is generally looked down upon as a low task and the safai karamcharis (officials for responsible for cleanliness) and waste pickers are treated shabbily.

Biomedical waste like bandages etc. and hazardous waste like batteries, paints are all disposed off in the same bin, which also contains kitchen waste thereby rendering the entire waste hazardous. People do so on account of several reasons. First, they are ignorant of the dos and don'ts and then there is no system of waste separation at the source in vogue in our country and finally they are also sluggish in doing such things. As far provision of bins is concerned, there are not even sufficient bins provided for the people to deposit their mixed household garbage and to have separate bins for different kinds of garbage is almost next to impossible. On the issue of provision of adequate infrastructural facilities like bins to the people, most of ULBs show their frustration and say that they do not have money for the same and people do not use the bins wherever these are placed. To be able to provide the facilities and improve service provision, many ULBs are today talking about levying user charges so to cover up the costs of the same. Since the waste generators benefit from the waste collection services, the idea is to charge them for the same. In North America there have been attempts to get the households to pay directly for their own waste removal on the basis of quantum of waste generated by them (UNEP 1996). It has been found that the system of fees on the basis of per unit of waste however works well if the households can afford the fee. If they are too poor to pay or the fees are high or when there are alternatives like throwing into the countryside, the system crumbles. In India, households which can afford to do the same, pay the user charges as service charges to private sweepers who collect waste on daily basis from their doors and deposit in the community bins for a small fee ranging from Rs 10-Rs 50 per month. This is not something new and has been there for many years now in our country. However, people are not ready to pay more and the poor often throw their wastes in the streets, by-lanes and roadsides, etc. Over the years people have become accustomed to low performance by the govt. bodies and hence are not very willing to pay to the ULBs.

Waste segregation, as mentioned above is not practised in India in the formal waste management system. However, informally most of Indian households separate recyclable matter like newspapers, magazines, old plastic bottles and jars, metallic substances, etc. The incentive for this is the money they get by selling the recyclable matter. Taking advantage of this mind-set of the people, incentives could be a good way to encourage people to segregate waste into different categories. A very good example of this is the city of Curitiba in Brazil (Box 4.6) which has been recognised the world over as a successful case of urban environmental management.

Box 4.6 Curitiba- a success case of environmental management

> *'Garbage Purchase Program,'* was one of the innovative waste management programs implemented by the city, to clean up areas inhabited by low-income population. These being the river basins, collection vehicles had no access to them. The program involved paying the residents if they collected their waste in plastic bags, instead of payment to private companies for collection. The payment was initially in bus tokens and later with bags of surplus food. Later in another project called *'Green Exchange,'* recyclable garbage generated from supermarkets, schools, factories were accepted in return of bags of food. The objective of another project *'All Clean,'* was to clean up specific areas of the city or empty plots where garbage accumulated by temporarily employing retired and unemployed people. In 1992, 2500 people participated in this project forming 120 teams that cleaned up 335 areas (UMP 1993).

Incentives of these kinds are something that can actually entice people to adopt sound practices like segregate waste/deposit (not throw!) the waste inside (and not outside!) the community bin. Since the ULBs spend some amount on waste collection activity (without achieving satisfactory results), if the same or a part of it is given away as incentives the results are probably going to be far better as in the case of Curitiba. In addition to giving incentives it is equally important to determine the *right* kind of incentives to get people involved and also to stay involved (Internet Conference 1998). Proper kind of combination of inducements is critical in promoting community participation. Once people get into the habit of sound practice, slowly the incentives could be withdrawn or can also be continued, depending upon the financial status of the ULB.

Public-Private Partnerships - a possible solution?

The academia, the municipal governments and the subject experts in SWM all over the world have been discussing the prospects of possibilities of PPP (public –private partnerships) to solve especially the financial problems of SWM. An alternative to full privatisation and full government ownership, PPP alternative offers a solution that allows each sector to contribute its strengths for the betterment of society (Internet site). The PPP formula calls for co-ownership and co-responsibilty. The kind of PPP arrangement that has been gaining ground in the Indian context is 'contracting out' collection and transportation of waste. This on one hand saves the ULB huge capital expenditures, and also simultaneously improves the efficiency and effectiveness of service subject to regular monitoring.

Cities of Surat, Chandigarh, Navi Mumbai, Rajkot, Hyderabad have experimented with PPP and have achieved success to considerable extent. Surat Municipal

Corporation has employed private contractors for road sweeping, waste collection and transportation to the disposal site. About 40% of the city's waste is transported by private contractors. Pre-May 1995 (when there was no concept of contracting) the level of waste collection was 30%. With an additional 10% investment and some planning, the collection efficiency is as high as 93% today (Vaidya, 1997a). Regular monitoring by the ULB officials of the services rendered by contractors ensures that the contractors deliver the promised goods. Surat, Navi Mumbai and Rajkot - all have in their contracts, appropriate clauses that guarantee that the contractors do not exploit the fact that the agreement has taken place. Navi Mumbai ULB allots the contract only for an initial period of 6 months and keeps on extending it if the performance is found satisfactory. Also it reserves the right of imposing penalties on the contractor if complaints are received from the community or the work is found unsatisfactory (Vaidya 1998b). The Rajkot and Surat ULBs also have a similar clause of imposing penalties, in their contracts.

The ULBs of Surat and Rajkot discovered an interesting aspect of the contracting concept, while implementing it. Both the ULBs realised that they were better off with partial contracting as then they had two parallel systems working and one could provide a back-up to the other in case either broke down. Also, then the contractors restrained from making unreasonable demands or threatened to stop work if they were not met, as it happened once in the experience of Rajkot (ibid).

Contracting being one of the most simple forms of PPP was easier in the case of Surat, Rajkot etc., however generally there is a lot of resistance from within the organisation whenever there are efforts to encourage PPP in SWM. In many state Municipal legislations that govern the municipal governments, SWM is defined as the obligatory responsibility of the municipality. Often, this is interpreted to mean that the municipality shall carry out the task on its own (Internet conference 1998) and thus stronger partnerships between the ULBs and private sector are hampered from emerging.

Also, unlike water and waste water treatment facilities which are capital intensive and therefore attract large domestic and international firms that go through a long and careful financial analysis, the PPP in SWM are typically small-scale and attract only local entrepreneurs. These local entrepreneurs also do not have the in-built capacity/capability to look at various other options. Thus the contracting out form of PPP for collection and transport of SW has become "popular" in India and would be more so in the coming days.

Corporate sector role

Environment and SWM within environment as an industry has a very long way to go in India. The basic ingredients necessary for the growth of an industry are availability of technology, strong market demand and ready capital. To attract the investors MNES and MA have schemes whereby they offer tax benefits, subsidies etc. to the ULBs/private sector for setting up waste disposal plants. After money, the next important thing is the technology. The technology for aerobic composting has been already established in the country and is being applied successfully, though by only one industry at the moment. For RDF, the pilot plant is there but no large-scale plants have been set up, though it has been almost 4 years after the pilot plant was made operational. Then there is the Anaerobic Digestion technology and Sanitary Landfills – both of these are doing well abroad, but truly speaking not a single plant of either of these in the country, except for AD, for which there is a small 1 ton per day plant and that too based on vegetable waste as the feed. So technology today is a stumbling block and the Indian corporate sector needs to collaborate with the western world - where the technology exists and modify and adapt it to Indian requirements and get going.

With an increase in energy prices in the future, the market scenario of energy is definitely going to undergo changes and then energy from waste is going to be a profit-making venture for the Indian businessman.

Role of academic/research institutions

Many research/academic institutions like All India Institute of Hygiene and Public Health, Calcutta, Tata Energy Research Institute, New Delhi and National Institute of Urban Affairs, New Delhi, undertake research on different aspects of SW. However most of the time, these reports are not available to the public, NGOs, government, etc. Hence the information gets blocked. It is not that these institutions are not willing to share the information and findings of their research, but since these are done either specifically for an outside agency which is also sponsoring it or are for in-house purposes, they get restrained from circulation to the outside world. Since, the research findings could immensely help the ULBs in their planning process they should work in closer collaboration with the same and also implement them to test their validity and improve upon it.

The final analysis

It is quite clear from the above sections that the entire process of SWM revolves around the ULBs in the country. Given below are the key issues and problems hampering scientific management of MSW that have emerged in the chapter.

Governance

Bureaucratic set-up
Political interference
Low priority to SWM
Lack of awareness/ motivation amongst employees

Non willingness to work especially in the sweeper community - a strong union resistance
Absence of accountability mechanisms
Lack of technical expertise
Centralised operations
Inability to provide basic infrastructural facilities to people for want of money

Financial

Very few fiscal instruments available
No financial autonomy - dependent on state governments
Financial reporting mechanisms highly inadequate
Rampant corruption

Legislative

Old and sparse laws
Weak enforcement mechanisms
Inability to frame own laws - have to get passed from the state legislature; long process; state govts. not willing to comply
Non-implementation of 74th CAA by the state governments

Technology

Not enough demonstration plants set up
Technology is in the process of being tested and applied
ULBs are unable to adopt technology due to financial compulsions

It is quite evident that the ULBs are extraordinarily dependent upon the respective state governments be it for legislative powers or the financial issues. Their technical capacity could develop with time, but experts say that for third world countries it is not the technical capacity for reducing pollution that is in doubt, but the political will and institutional capacity to act effectively (Hardoy, Miltin and Satterthwaite, 1992) The most urgent need today is to strengthen the ULBs, to improve their financial base and then to introduce appropriate waste management technologies –in that order of priority (Elkington, John & Shopley and Jonathan, 1989). The 74th CAA was passed with the aim of strengthening the institutional base of ULBs, but the Act was reduced to mere paper work as it was suggestive and not binding upon the state governments. The state governments are not willing to take any follow-up action on the Act as they are in no mood to give legislative and financial autonomy to the ULBs. Thus, the priority becomes to first scrap off the political overtones associated with the ULBs, if the ULBs wish to function as the bodies of governance at the urban local level in true sense.

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5

Conclusions

In the preceding chapters, we have looked at some salient features of environmental policy in India. We have focussed on three sectors; air, water and solid waste management. In this chapter, we will draw some conclusions, look at some interlinkages and commonalties across these sectors.

Improving coordination

A few things stand out very distinctly. There is a fragmented approach to environmental protection. Functions are duplicated across organizations. Some functions are not clearly defined. Where different organizations do exist, links among them are weak. In our analysis, we have noted the multiplicity of organizations in the water and urban transport sectors.

Recently the need for better coordination is being noted. Some efforts are in place to create new organizations where needed. The Northeast is now moving towards a nodal agency on renewable energy programs; some states are setting up state level organizations for planning and developing water resources. The need for forming river basin organizations is being appreciated.

Decentralization

Another significant trend in managing water and solid waste is that of decentralization. The idea is to strengthen municipal and rural (local) governments. However, as noted in both the chapters on water and solid waste management , the current range of efforts will have to be strengthened further. The devolution of financial powers also presents an important challenge. The success of decentralization depends on how far states are willing to let go of their powers and confer greater autonomy on the local bodies.

Institutional Reform

Several institutional reforms are further necessary. There is a need to create transparency and improve accountability mechanisms. Subsidy and pricing structures require reform in all the three sectors. The experience of other developing and developed countries gives some lessons to learn from.

Financial Health

Financial health will be another important issue. State irrigation departments and drinking water utilities need to be given incentives in order to perform better. In the context of urban local bodies, much will depend on how far the states are willing to let go of their financial hold on them and let them be financially autonomous.

Legal Reform

On the legal framework, a few challenges remain. The available legislative instruments are either not sufficient or are not being implemented. There are areas where legislation is still needed as in the case of ground water and municipal waste management.

In all the three sectors, some of our laws are very old. These need to be looked at and reformed. A few laws are inconsistent with others.

The lack of clarity in many leaves loopholes for evasion. The unclear and conflicting laws on the one hand and rising national consciousness on environment on the other have culminated in growing incidence of public interest litigation in the country. Public interest litigation is a natural outcome and would prove to be a strong tool for the common man in the coming years.

Enforcement Mechanisms

Enforcement mechanisms need strengthening. This is where we need to address issues of improving the performance of monitoring agencies. These monitoring agencies have to be given sufficient power and authority for enforcement. Possible points of intervention could be restructuring the Pollution Control Boards, building in accountability and greater incentives to perform.

Involvement of stakeholders

There is evidence of growing involvement of stakeholders in the evolution of policy in all the three sectors studied in this report. This evidence comes forth, for instance, in the process of setting up environmental standards. The academia, NGOs and multi-laterals are serving as strong pressure points demanding for reform in the bureaucracy, legislation and the use of economic instruments for effective environmental pollution control.

Another impact of stakeholders is seen in terms of greater transparency and access to environmental data. NGOs and academia openly press for more access to information and data. As a result, the Central Pollution Control Board has stepped up efforts for disseminating data on the environmental quality of cities.

There is also a changing perception of the role of the state from a regulator to a promoter of balanced and sustainable development. This is very evident in the case of ground water. Similarly, in the context of managing air quality, it is felt that the government must play a more facilitating and expediting role. It is for the industry to shoulder greater responsibility. The public would also have to take a more proactive stance and focus on duties rather than merely pressing for rights.

In the case of water as much as that of municipal solid waste, the tendency is to view these services provided as a free good. There is little awareness in the public of the costs borne by the agencies providing these services.

However, studies in both sectors show that there is also a willingness to pay for service of good quality. In fact, when people do not get water through formalized sources, they end up paying much more through informal sources.

Multilaterals, apart from being catalysts of reform have been active in supporting community-based initiatives. In the case of water, they have been valuable sources of technical and administrative support.

Conclusion

Thus, there is some evidence of greater involvement of stakeholders in policy setting in India. It appears that there is a generic move from centralized regulation and control to a regime of greater decentralization. Civil society is taking interest in environmental policy setting. In certain segments and sectors, it has become a force to be reckoned with.

Challenges of governance, nevertheless, are important. Notable issues are those of accountability and transparency in the environmental bureaucracy. Also important will be other avenues of legislative and institutional reform.

Appendix 1

74th Constitution Amendment Act, 1992

[30b][PART IX-A

THE MUNICIPALITIES

243-P. **Definitions.**—In this Part, unless the context otherwise requires,—

(*a*) "Committee" means a Committee constituted under Article 243-S;

(*b*) "district" means a district in a State;

(*c*) "Metropolitan area" means an area having a population of ten lakhs or more, comprised in one or more districts and consisting of two or more Municipalities or Panchayats or other contiguous areas, specified by the Governor by public notification to be a Metropolitan area for the purposes of this Part;

(*d*) "Municipal area" means the territorial area of a Municipality as is notified by the Governor;

(*e*) "Municipality" means an institution of self-government constituted under Article 243-Q;

(*f*) "Panchayat" means a Panchayat constituted under Article 243-B;

(*g*) "population" means the population as ascertained at the last preceding census of which the relevant figures have been published.

243-Q. **Constitution of Municipalities.**—(1) There shall be constituted in every State,—

30b. Part IX-A *ins.* by the Constitution (Seventy-fourth) Amendment Act, 1992, S. 2 (w.e.f. 1-6-1993).

(*a*) a Nagar Panchayat (by whatever name called) for a transitional area, that is to say, an area in transition from a rural area to an urban area;

(*b*) a Municipal Council for a smaller urban area; and

(*c*) a Municipal Corporation for a larger urban area,

in accordance with the provisions of this Part:

Provided that a Municipality under this clause may not be constituted in such urban area or part thereof as the Governor may, having regard to the size of the area and the municipal services being provided or proposed to be provided by an industrial establishment in that area and such other factors as he may deem fit, by public notification, specify to be an industrial township.

(2) In this article, "a transitional area", "a smaller urban area" or "a larger urban area" means such area as the Governor may, having regard to the population of the area, the density of the population therein, the revenue generated for local administration, the percentage of employment in non-agricultural activities, the economic importance or such other factors as he may deem fit, specify by public notification for the purposes of this Part.

243-R. Composition of Municipalities.—(1) Save as provided in clause (2), all the seats in a Municipality shall be filled by persons chosen by direct election from the territorial constituencies in the Municipal area and for this purpose each Municipal area shall be divided into territorial constituencies to be known as wards.

(2) The Legislature of a State may, by law, provide—

(*a*) for the representation in a Municipality of—

(*i*) persons having special knowledge or experience in Municipal administration;

(*ii*) the members of the House of the People and the members of the Legislative Assembly of the State representing constituencies which comprise wholly or partly the Municipal area;

(*iii*) the members of the Council of States and the members of the Legislative Council of the State registered as electors within the Municipal area;

(*iv*) the Chairpersons of the Committees constituted under clause (5) of Article 243-S:

Provided that the persons referred to in paragraph (i) shall not have the right to vote in the meetings of the Municipality;

(*b*) the manner of election of the Chairperson of a Municipality.

243-S. Constitution and composition of Wards Committees, etc.—(1) There shall be constituted Wards Committees, consisting of one or more wards, within the territorial area of a Municipality having a population of three lakhs or more.

(2) The Legislature of a State may, by law, make provision with respect to—

(*a*) the composition and the territorial area of a Wards Committee;

(*b*) the manner in which the seats in a Wards Committee shall be filled.

(3) A member of a Municipality representing a ward within the territorial area of the Wards Committee shall be a member of that Committee.

(4) Where a Wards Committee consists of—

(a) one ward, the member representing that ward in the Municipality; or

(b) two or more wards, one of the members representing such wards in the Municipality elected by the members of the Wards Committee,

shall be the Chairperson of that Committee.

(5) Nothing in this article shall be deemed to prevent the Legislature of a State from making any provision for the constitution of Committees in addition to the Wards Committees.

243-T. Reservation of seats.—(1) Seats shall be reserved for the Scheduled Castes and the Scheduled Tribes in every Municipality and the number of seats so reserved shall bear, as nearly as may be, the same proportion to the total number of seats to be filled by direct election in that Municipality as the population of the Scheduled Castes in the Municipal area or of the Scheduled Tribes in the Municipal area bears to the total population of that area and such seats may be allotted by rotation to different constituencies in a Municipality.

(2) Not less than one-third of the total number of seats reserved under clause (1) shall be reserved for women belonging to the Scheduled Castes or as the case may be, the Scheduled Tribes.

(3) Not less than one-third (including the number of seats reserved for women belonging to the Scheduled Castes and the Scheduled Tribes) of the total number of seats to be filled by direct election in every Municipality shall be reserved for women and such seats may be allotted by rotation to different constituencies in a Municipality.

(4) The officers of Chairpersons in the Municipalities shall be reserved for the Scheduled Castes, the Scheduled Tribes and women in such manner as the Legislature of a State may, by law, provide.

(5) The reservation of seats under clauses (1) and (2) and the reservation of offices of Chairpersons (other than the reservation for women) under clause (4) shall cease to have effect on the expiration of the period specified in Article 334.

(6) Nothing in this Part shall prevent the Legislature of a State from making any provision for reservation of seats in any Municipality or offices of Chairpersons in the Municipalities in favour of backward class of citizens.

243-U. Duration of Municipalities, etc.—(1) Every Municipality, unless sooner dissolved under any law for the time being in force, shall continue for five years from the date appointed for its first meeting and no longer:

Provided that a Municipality shall be given a reasonable opportunity of being heard before its dissolution.

(2) No amendment of any law for the time being in force shall have the effect of causing dissolution of a Municipality at any level, which is functioning immediately before such amendment, till the expiration of its duration specified in clause (1).

(3) An election to constitute a Municipality shall be completed,—

(a) before the expiry of its duration specified in clause (1);

(b) before the expiration of a period of six months from the date of its dissolution:

Provided that where the remainder of the period for which the dissolved Municipality would have continued is less than six months, it shall not be necessary to hold any election under this clause for constituting the Municipality for such period.

(4) A Municipality constituted upon the dissolution of a Municipality before the expiration of its duration shall continue only for the remainder of the period for which the dissolved Municipality would have continued under clause (1) had it not been so dissolved.

243-V. Disqualifications for membership.—(1) A person shall be disqualified for being chosen as, and for being, a member of a Municipality—

(*a*) if he is so disqualified by or under any law for the time being in force for the purposes of elections to the Legislature of the State concerned:

Provided that no person shall be disqualified on the ground that he is less than twenty-five years of age, if he has attained the age of twenty-one years;

(*b*) if he is so disqualified by or under any law made by the Legislature of the State.

(2) If any question arises as to whether a member of a Municipality has become subject to any of the disqualifications mentioned in clause (1), the question shall be referred for the decision of such authority and in such manner as the Legislature of a State may, by law, provide.

243-W. Powers, authority and responsibilities of Municipalities, etc.—Subject to the provisions of this Constitution, the Legislature of a State may, by law, endow—

(*a*) the Municipalities with such powers and authority as may be necessary to enable them to function as institutions of self-government and such law may contain provisions for the devolution of powers and responsibilities upon Municipalities, subject to such conditions as may be specified therein, with respect to—

 (*i*) the preparation of plans for economic development and social justice;

 (*ii*) the performance of functions and the implementation of schemes as may be entrusted to them including those in relation to the matters listed in the Twelfth Schedule;

(*b*) the Committees with such powers and authority as may be necessary to enable them to carry out the responsibilities conferred upon them including those in relation to the matters listed in the Twelfth Schedule.

243-X. Power to impose taxes by, and Funds of, the Municipalities.—The Legislature of a State may, by law,—

(*a*) authorise a Municipality to levy, collect and appropriate such taxes, duties, tolls and fees in accordance with such procedure and subject to such limits;

(*b*) assign to a Municipality such taxes, duties, tolls and fees levied and collected by the State Government for such purposes and subject to such conditions and limits;

- (*c*) provide for making such grants-in-aid to the Municipalities from the Consolidated Fund of the State; and
- (*d*) provide for constitution of such Funds for crediting all moneys received, respectively, by or on behalf of the Municipalities and also for the withdrawal of such moneys therefrom,

as may be specified in the law.

243-Y. Finance Commission.—(1) The Finance Commission constituted under Article 243-I shall also review the financial position of the Municipalities and make recommendations to the Governor as to—

- (*a*) the principles which should govern—
    - (*i*) the distribution between the State and the Municipalities of the net proceeds of the taxes, duties, tolls and fees leviable by the State, which may be divided between them under this Part and the allocation between the Municipalities at all levels of their respective shares of such proceeds;
    - (*ii*) the determination of the taxes, duties, tolls and fees which may be assigned to, or appropriated by, the Municipalities;
    - (*iii*) the grants-in-aid to the Municipalities from the Consolidated Fund of the State;
- (*b*) the measures needed to improve the financial position of the Municipalities;
- (*c*) any other matter referred to the Finance Commission by the Governor in the interests of sound finance of the Municipalities.

(2) The Governor shall cause every recommendation made by the Commission under this article together with an explanatory memorandum as to the action taken thereon to be laid before the Legislature of the State.

243-Z. Audit of accounts of Municipalities.—The Legislature of a State may, by law, make provisions with respect to the maintenance of accounts by the Municipalities and the auditing of such accounts.

243-ZA. Elections to the Municipalities.—(1) The superintendence, direction and control of the preparation of electoral rolls for, and the conduct of, all elections to the Municipalities shall be vested in the State Election Commission referred to in Article 243-K.

(2) Subject to the provisions of this Constitution, the Legislature of a State may, by law, make provision with respect to all matters relating to, or in connection with, elections to the Municipalities.

243-ZB. Application to Union territories.—The provisions of this Part shall apply to the Union territories and shall, in their application to a Union territory, have effect as if the references to the Governor of a State were references to the Administrator of the Union territory appointed under Article 239 and references to the Legislature or the Legislative Assembly of a State were references in relation to a Union territory having a Legislative Assembly, to that Legislative Assembly:

Provided that the President may, by public notification, direct that the provisions of this Part shall apply to any Union territory or part thereof subject to such exceptions and modifications as he may specify in the notification.

243-ZC. Part not to apply to certain areas.—(1) Nothing in this Part shall apply to the Scheduled Areas referred to in clause (1), and the tribal areas referred to in clause (2), of Article 244.

(2) Nothing in this Part shall be construed to affect the functions and powers of the Darjeeling Gorkha Hill Council constituted under any law for the time being in force for the hill areas of the district of Darjeeling in the State of West Bengal.

(3) Notwithstanding anything in this Constitution, Parliament may, by law, extend the provisions of this Part to the Scheduled Areas and the tribal areas referred to in clause (1) subject to such exceptions and modifications as may be specified in such law, and no such law shall be deemed to be an amendement of this Constitution for the purposes of Article 368.

243-ZD. Committee for district planning.—(1) There shall be constituted in every State at the district level a District Planning Committee to consolidate the plans prepared by the Panchayats and the Municipalities in the district and to prepare a draft development plan for the district as a whole.

(2) The Legislature of a State may, by law, make provision with respect to—

(*a*) the composition of the District Planning Committees;

(*b*) the manner in which the seats in such Committees shall be filled:

Provided that not less than four-fifths of the total number of members of such Committee shall be elected by, and from amongst, the elected members of the Panchayat at the district level and of the Municipalities in the district in proportion to the ratio between the population of the rural areas and of the urban areas in the district;

(*c*) the functions relating to district planning which may be assigned to such Committees;

(*d*) the manner in which the Chairpersons of such Committees shall be chosen.

(3) Every District Planning Committee shall, in preparing the draft development plan,—

(*a*) have regard to—

(*i*) matters of common interest between the Panchayats and the Municipalities including spatial planning, sharing of water and other physical and natural resources, the integrated development of infrastructure and environmental conservation;

(*ii*) the extent and type of available resources whether financial or otherwise;

(*b*) consult such institutions and organisations as the Governor may, by order, specify.

(4) The Chairperson of every District Planning Committee shall forward the development plan, as recommended by such Committee, to the Government of the State.

243-ZE. Committee for Metropolitan planning.—(1) There shall be constituted in every Metropolitan area a Metropolitan Planning Committee to prepare a draft development plan for the Metropolitan area as a whole.

(2) The Legislature of a State may, by law, make provision with respect to—

(*a*) the composition of the Metropolitan Planning Committees;

(*b*) the manner in which the seats in such Committees shall be filled:

Provided that not less than two-thirds of the members of such Committee shall be elected by, and from amongst, the elected members of the Municipalities and Chairpersons of the Panchayats in the Metropolitan area in proportion to the ratio between the population of the Municipalities and of the Panchayats in that area;

(*c*) the representation in such Committees of the Government of India and the Government of the State and of such organisations and institutions as may be deemed necessary for carrying out the functions assigned to such Committees;

(*d*) the functions relating to planning and coordination for the Metropolitan area which may be assigned to such Committees;

(*e*) the manner in which the Chairpersons of such Committees shall be chosen.

(3) Every Metropolitan Planning Committee shall, in preparing the draft development plan,

(*a*) have regard to—

(*i*) the plans prepared by the Municipalities and the Panchayats in the Metropolitan area;

(*ii*) matters of common interest between the Municipalities and the Panchayats, including co-ordinated spatial planning of the area, sharing of water and other physical and natural resources, the integrated development of infrastructure and environmental conservation;

(*iii*) the overall objectives and priorities set by the Government of India and the Government of the State;

(*iv*) the extent and nature of investments likely to be made in the Metropolitan area by agencies of the Government of India and of the Government of the State and other available resources whether financial or otherwise;

(*b*) consult such institutions and organisations as the Governor may, by order, specify.

(4) The Chairperson of every Metropolitan Planning Committee shall forward the development plan, as recommended by such Committee, to the Government of the State.

243-ZF. Continuance of existing laws and Municipalities.—Notwithstanding anything in this Part, any provision of any law relating to Municipalities in force in a State immediately before the commencement of the Constitution (Seventy-fourth Amendment) Act, 1992, which is inconsistent with the provisions of this Part, shall continue to be in force until amended or repealed by a competent Legislature or other competent authority or until the expiration of one year from such commencement, whichever is earlier:

Provided that all the Municipalities existing immediately before such commencement shall continue till the expiration of their duration, unless sooner dissolved by a resolution passed to that effect by the Legislative

Assembly of that State or, in the case of a State having a Legislative Council, by each House of the Legislature of that State.

243-ZG. Bar to interference by courts in electoral matters.—Notwithstanding anything in this Constitution,—

(*a*) the validity of any law relating to the delimitation of constituencies or the alloment of seats to such constituencies, made or purporting to be made under Article 243-ZA shall not be called in question in any court;

(*b*) no election to any Municipality shall be called in question except by an election petition presented to such authority and in such manner as is provided for by or under any law made by the Legislature of a State.]

Appendix 2

Taxation powers under various municipal laws

Legislation	*Obligatory Taxes*	*Discretionary Taxes*
Hyderabad Municipal Corporation Act, 1955. Sections 197, 199 and 248.	Taxes on lands and buildings including -a general tax -water tax -drainage tax -lighting tax -conservancy tax Octroi Tax on vehicles Tax on animals and boats Tax on advertisements Tax on transfer of immovable properties Tax on entertainment Tax on dogs	
City of Bangalore Municipal Corporation Act, 1949		- Property taxes; - Profession tax; - Tax on carriages and animals; - Tax on carts; - Toll tax; - Tax on advertisements; - Duty on certain transfers of property; and - Any other taxes which the state legislature has power to impose
Bombay Municipal Corporation Act, 1888 Section 139 and 191 A	- Property taxes (water tax, halalkhor tax, general tax, betterment charges etc.) -Tax on vehicles and animals; - Dog tax; - Theatre tax; and - Octroi;	- Education cess; and - Any other taxes which the state legislature has power to impose
Calcutta Municipal Corporation Act, 1980	- Property taxes (consolidated rate on lands & buildings); - Profession tax, tax on trades and callings; - Advertisement tax; and - Toll tax	- Other taxes. The corporation may, if so authorised by any other law for the time being in force, realise any tax, development charge, cess or fee imposed under that law in accordance with the provisions thereof (Section 210 to 213 of the corporation act, 1980)
Madras City Municipal Corporation Act, 1919		- Property taxes (water tax, drainage tax lighting tax, general tax); - Tax on companies; - Profession tax; - Tax on carriages and animals; - Tax on carts;

Legislation	*Obligatory Taxes*	*Discretionary Taxes*
		- Tax on timber brought into the city; - Tax on advertisement; - Duty on certain transfers of properties; and - Any other taxes which the state legislature has power to impose
Madurai City Municipal Corporation Act, 1965		- Property tax; - Profession tax; - Tax on carriages and animals; - Tax on carts; - Tax on advertisements; - Duty on certain transfer of properties; - Pilgrim tax with certain conditions; and - Any other taxes which the state legislature has power to impose
Patna Corporation Act, 1951		- Tax on holdings (property tax); - Water tax; - Latrine tax; - Lighting tax; - Drainage tax; - Vehicle & animal tax - Fee for registration of carts, vehicles and animals; - Profession tax, tax on trades and callings and employment; - Toll on animals and vehicles - Fee on the registration of dogs (dog tax); - Fee on vessels (Boat tax); - Fee on vessels (Boat tax); - Fee on registration of platforms; -Advertisement tax; and - Any other taxes which the state legislature has power to impose
Bombay Provincial Municipal Corporations Act, 1949 Section 127 and 129	- Property taxes (Water Tax, conservancy tax, general tax); and - Tax on vehicles, boats and animals	- Octroi - Professional tax; - tax on dogs; - Theatre tax; - Toll on animals and vehicles; and - Any other taxes which the state legislature has power to impose
Karnataka Municipal Corporation Act, 1976 Section 103 and 140		- Profession tax - Tax on carriage and animals; - Tax on carts; - Toll tax on vehicles excluding motor vehicles paying vehicle tax under the Karnataka motor vehicle taxation Act, 1957, entering the corporation limits; - Advertisement tax; - Duty on certain transfer of properties; - General sanitary cess for construction or maintenance or both of public privies and for the removal and disposal of refuse - Water tax/rates; and - Any other taxes which the state legislature has power to impose.

Legislation	*Obligatory Taxes*	*Discretionary Taxes*
Kerala Municipal Corporation Act, 1961		- Property taxes (general tax, scavenging tax, water tax, drainage tax, lighting tax); - Profession tax; - Tax on animals, vessels and vehicles; - Show tax; - Tax on timber brought into the city; - Tax on advertisements; - Duty on certain transfers of property; and - Any other taxes which the state legislature has power to impose
Orissa Municipal Act, 1950 Section 131	Lighting tax Drainage tax Latrine tax Tax on carriages, carts and horses Tax on profession, art and callings Poll tax on animals, carts and carriages other than motor-vehicles carrying goods or passengers and entering the municipality where a festival or fair is being held Fee on registration of dogs Tax on holdings situated within the municipality Octroi Fee on vessels moored within the limits or the municipality at ghats or landing places constructed and maintained by the municipal council	
Andhra Pradesh Municipalities Act, 1965. Section 81, 82 and 85	Property tax consisting of -tax for general purpose -water and drainage tax -lighting tax -scavenging tax Tax on carriages and carts Tax on animals Tax on advertisements Duty on certain transfers of property	
Madhya Pradesh Municipal Corporation Act, 1956	- Property taxes; - Latrine or conservancy tax; - General sanitary cess; and - Water tax/rate	- Profession tax, tax on trade and callings; - Tax on vehicles and animals; - Dog tax; - Toll on vehicles and animals; - Cattle registration fee; - Lighting tax; - Market fee; - Drainage tax; - Betterment tax; - Tax on pilgrims; - Tax on persons, occupying houses, buildings or lands within the limits of the corporation; - Terminal tax; - Advertisement tax; - Toll on new bridges; - Theatre/Show tax; and

Legislation	*Obligatory Taxes*	*Discretionary Taxes*
		- any other taxes which the state legislature has power to impose.
U P Nagar Mahapalika Adhiniyam, 1959	- Property taxes; - Tax on vehicles; - Tax on animals; and - Tax on boats;	- Tax on trade, callings and professions and on holdings of public or private appointments; - Octroi; - Terminal tax if imposed at the commencement of the constitution (octroi and terminal tax shall not be levied at the same time); - Toll tax on vehicles & other conveyance and animals; - Tax on dogs; - Betterment tax; - Tax on deeds of transfer of immovable property; - Advertisement tax; - Theatre tax; and - Any other taxes which the state legislature has power to impose

Note. * In the Act, no distinction has been made between obligatory and discretionary nature of taxes. Any or all of the taxes as mentioned can be levied in the whole or any part of the corporation.
Source. MUD 1989 and HSMI 1996.

Appendix 3

List of Municipal Laws

	Year
Bombay Municipal Corporation Act	1888
Punjab Municipal Act	1911
U.P. Municipalities Act	1916
Madras city Municipal Corporation Act	1919
Tamil Nadu District Municipalities Act	1920
Bihar and Orissa Muncipal Act*	1922
Bengal Municipal Act**	1932
Bombay Provincial Municipal Corporation Act	1949
Orissa Municipal Act	1950
Jammu and Kashmir Municipal Act	1951
Patna Municipal Corporation Act	1951
Calcutta Municipal Act	1951
Hyderabad Municipal Corporation Act	1955
Assam Municipal Act	1956
Delhi Municipal Corporation Act	1957
Rajasthan Municipalities Act	1959
Uttar Pradesh Nagar Mahapalika Adhiniyam	1959
Kamataka Municipalities Act	1960
Kerala Municipalities Act	1960
Kerala Municipal Corporation Act	1961
Madhya Pradesh Municipalities Act	1961
Gujarat Municipalities Act	1963
Kamataka Municipalities Act	1964
Andhra Pradesh Municipalities Act	1965
Maharashtra Municipalities Act	1965
Goa, Daman and Diu Municipal Act	1968
Himachal Pradesh Municipal Act	1968
Gauhati Municipal Corporation Act	1969
Haryana Municipal Act	1973
Meghalaya Municipalities Act	1973
Pondicherry Municipalities Act	1973
Manipur Municipalities Act	1976
Kamataka Municipal Corporation Act	1976
Punjab Municipal Corporation Act	1976
Kamataka Municipal Corporation Act	1977
Bizarre Municipal Corporation Act	1978
Calcutta Municipal Corporation Act	1980
Andean and Nicobar Islands (Municipal) Regulation	1994
Andhra Pradesh Municipal Corporation Act	1994
Haryana Municipal Corporation Ordinance	1994
Himachal Pradesh Municipal Corporation Act	1994
Himachal Pradesh Municipal Act	1994
Manipur Municipalities Ordinance	1994
Punjab Municipal Corporation Law (Extension to Chandigarh)	1994
Tripura Municipal Act	1994

Notes. *Applicable only to Bihar

** Applicable to West Bengal

Appendix 4

List of municipal acts having SWM as an obligatory duty for the ULBs governed by them

Municipalities governed by following Acts
Andhra Pradesh Municipalities Act
Bangalore Municipal Corporation Act
Bengal Municipal Act**
Bihar and Orissa Muncipal Act*
Delhi Municipal Corporation Act
Goa, Daman and Diu Municipal Act
Gujarat Municipalities Act
Himachal Pradesh Municipal Act
Jammu and Kashmir Municipal Act
Karnataka Municipalities Act
Kerala Municipalities Act
Madhya Pradesh Municipalities Act
Punjab Municipal Corporation Act
Punjab Municipal Corporation Law (Extension to Chandigarh)
Rajasthan Municipalities Act
Tamil Nadu District Municipalities Act
Uttar Pradesh Nagar Mahapalika Adhiniyam
Orissa Muncipal Act
Maharashtra Municipalities Act
Bombay Provincial Muncipal Corporation Act
Karnataka Municipal Corporation Act
Kerala Municipal Corporation Act
Madhya Pradesh Municipal Corporation Act
Uttar Pradesh Municipal Corporation Act
Bombay Municipal Corporation Act
Bangalore Muncipal Corporation Act
Calcutta Municipal Corporation Act
Hyderabad Municipal Corporation Act
Madras city Municipal Corporation Act
Patna Municipal Corporation Act

Source: MUD 1989 and HSMI 1996.